LIBERTY™

CONTINUOUS-PACK AUTOMATED SIDE LOADER

OPERATION MANUAL

ISSUED MAY 2020

⚠ WARNING

Failure to follow all instructions and safety precautions in this manual, in the Service Manual, in other manufacturers' manuals and on the safety decals attached to the product could result in serious injury or death to operators or bystanders and/or damage to property.

DO NOT operate this vehicle before you READ and UNDERSTAND this Operation Manual, the Service Manual for this unit, other applicable manufacturers' manuals, and the safety decals on the product.

Each operator of this unit must read and understand all directions in this manual before they first operate this vehicle.

Keep this manual in the cab for new operators and to remind all operators about safe use.



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TP1L-OM-0520



READ THIS MANUAL!

EVERY PERSON who will **OPERATE, MAINTAIN, REPAIR, OR OTHERWISE WORK** with the Heil unit **MUST READ AND UNDERSTAND** this entire Operator's Manual before starting the engine or activating any switches or controls. **MAKE SURE** to read the Service Manual for the unit **BEFORE** you do any maintenance or repair procedures.

ALL USERS of this equipment must be trained professionals who understand how the machine operates and know how to avoid the risks associated with driving the vehicle and with picking up, compacting, and dumping refuse in an ever-changing traffic environment.

If you do not understand an operation or instruction, seek additional help or instruction from a qualified source **BEFORE** you operate the unit.

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NOTES:

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CONTINUOUS-PACK AUTOMATED SIDE LOADER

OPERATION MANUAL

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NOTES:

SECTION 1
INTRODUCTION

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PREVIEW

Read this section to learn about:

- The responsibilities of the owner, the operator, and the mechanic
- Warranty information
- Telephone numbers and website URL for parts, technical support, warranty claims, training and manuals
- Identifying the different models
- Identifying the left (street side) of the unit
- The unit serial plate
- Various parts of the unit

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HOW TO USE THIS MANUAL

Product Variance

This manual may cover options not included on your unit. Also, the location and appearance of the controls on your unit may be different than those shown in this manual. Make sure you know the location of the controls and how to properly operate the controls on your unit before operation.

Manual Sections

This manual is divided into twelve (12) sections.

1. Introduction
2. Safety Messages and Decals
3. Lock-Out/Tag-Out Procedures
4. Features, Controls, Switches, and Indicator Lights
5. Body and Tailgate Props
6. Daily Checklist
7. Before Going on Route
8. On-Route Operation Procedures
9. Landfill/Transfer Station/Recycle Center Procedures
10. End of Day Procedures
11. Preventive Maintenance Chart
12. Lubrication Guide

Terminology

This manual uses terminology that is defined in the **Glossary** which is in Section 1, Introduction.

Directives

When we give directions for using the equipment, we capitalize key words. These words are usually a command followed by a result.

For example, “MOVE the body raise switch to LOWER ...”.

*Use of **Bold** and CAPITAL Letters*

We also put some words in **BOLD AND CAPS** for emphasis, usually related to safety or something of other importance, such as “**MAKE SURE** you close the side doors”.

We put some words in just bold for emphasis, such as “All warranty repairs **must** be performed by …”.

Each DANGER, WARNING, and CAUTION notice precedes its applicable text.

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TO THE OWNER

This manual is designed to help ensure safe, efficient and proper operation of The Heil Co. d/b/a Heil Environmental ("Heil") Liberty™ Automated Side Loader (ASL) refuse collection vehicle (or the unit).

The manual will familiarize you with the unit and will give you proper operating procedures and tips.

For chassis operation and maintenance instructions, see the Chassis Owner's Manual and the Liberty™ Service Manual.

As the owner, you have several responsibilities:

- You must complete and return the warranty registration for the unit to Heil.
- You must make sure that each operator has the proper driver's license.
- You must make sure that the operator does not operate the unit under the influence of drugs or alcohol.
- You must make sure that the unit is properly maintained to meet all local, state and federal requirements.
- You must keep the vehicle maintained and properly adjusted to meet the manufacturer's standards and recommendations.
- You must keep accurate records of daily inspections, breakdowns, malfunctions, maintenance and repairs of the unit.
- You must make sure that repairs are made that may affect the safe operation of the unit before it is made available for operation.
- You must provide adequate lighting on the unit for safe operation under low light or night conditions.
- You must provide adequate training for each operator and mechanic that will operate the unit BEFORE an operator goes on route or BEFORE a mechanic performs maintenance or repair procedures.
- You must determine if an operator or mechanic has difficulties reading or understanding this manual. When a person has difficulties reading or understanding this manual, you must provide adequate assistance so that the person does understand the material in this manual.
- You must make sure that each operator uses the equipment on a route as given in the instructions of this manual and other manufacturers' manuals.
- You must provide on-going training for each operator and mechanic that operates the unit.
- You must make sure that this manual stays with the vehicle at all times.

Properly operated and maintained, your Liberty™ unit should give you years of low-cost, trouble free service.

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TO THE OPERATOR

⚠ DANGER

Do not operate the unit or perform repair or maintenance procedures on the unit until you read and understand all of the instructions in this manual. Failure to do so may result in injury or death to operators or bystanders.

NOTICE

For Compressed Natural Gas (CNG) units, this Operation Manual should be used in conjunction with any associated CNG System Manufacturer's Operation and Maintenance Manuals. Always read and understand all associated manuals alongside the Heil Parts and Service Manual and Heil Operation Manual.

As the operator of the unit, you have several responsibilities:

- You must have a valid driver’s license.
- You must understand and follow all manufacturers’ instructions for equipment operation.
- You must observe pertinent laws and regulations.
- Do not use drugs or alcohol while you operate the unit.
- You must read, study and understand all procedures and requirements of this Operation Manual before you operate the unit for the first time.If you do not understand or have difficulty reading this manual, YOU MUST tell the owner or designated person before you operate the unit. DO NOT operate the unit until you understand the procedures and requirements of this manual.
- You must receive proper training before you operate (or service and maintain) the unit. If you have not been trained, you must inform the owner.
- You must perform a daily inspection of the unit before you go on route. Refer to the **Daily Checklist** 77.
- You must make sure that all decals and labels are clean and readable.
- You must report to the owner (or the designated person) any and all deficiencies, malfunctions or problems you find during the daily inspection.
- You must read, understand and obey all safety messages and decals that are on the outside or in the cab of the unit.

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TO THE OPERATOR (CONTINUED)

- Always use your employer's Lock-Out/Tag-Out procedures. If your employer does not have Lock-Out/Tag-Out procedures, use the **Lock-Out/Tag-Out Procedure** 47 in this manual.
- Before you start the engine or operate the unit for the first time
 - You must clear the area of other people.
 - You must learn and practice safe use of all controls and indicators before you operate the unit in a collection route environment or before you do repair or maintenance procedures.
- Before each time you start the engine or operate the unit, you must clear the area of other people.
- Before you operate the unit in reverse, you must make sure the area behind the unit is clear of other people, vehicles or other obstructions.
- You must make sure the unit is on hard, stable ground when you unload refuse at the landfill or transfer station.

TO THE MECHANIC

⚠ WARNING

Do not operate the unit or perform repair or maintenance procedures on the unit until you read and understand all of the instructions in this manual. Failure to do so may result in injury or death to operators or bystanders and/or damage to the unit or other property.

⚠ WARNING

A unit that needs service or repair can malfunction and create a dangerous condition. A part failure during operation can cause serious injury or death to a person or damage to the unit. Repair or replace any failed or defective part immediately.

NOTICE

If you do not understand a procedure or instruction, tell the owner or the designated person immediately. Do not operate the unit if you do not understand all procedures and instructions in this manual. The owner or designated person can contact your Heil dealer or Heil for additional help. See **Customer Service and Repair Parts Contact Information** 11.

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TO THE MECHANIC (CONTINUED)

As the mechanic of the unit, you have several responsibilities:

- You must have a valid driver's license if you operate the unit on a public road.
- You must understand and follow all manufacturers' instructions for equipment operation.
- You must observe pertinent laws and regulations.
- Do not use drugs or alcohol while you service or operate the unit.
- You must read, study and understand all procedures and requirements of this Operation Manual and the Service Manual before you operate the unit for the first time.
- If you do not understand or have difficulty reading this manual or the Service Manual, You must tell the owner or designated person before you operate or service the unit.
- DO NOT operate or service the unit until you understand the procedures and requirements of this manual and the Service Manual.
- You must receive proper training before you operate or service and maintain the unit. If you have not been trained, you must inform the owner.
- You must read, understand, and obey all safety messages and decals that are on the outside or in the cab of the unit.
- Always use your employer's Lock-Out/Tag-Out procedures. If your employer does not have Lock-Out/Tag-Out procedures, use the **Lock-Out/Tag-Out Procedure** 47 in this manual.
- Before you start the engine or operate the unit for the first time:
 - You must clear the area of other people
 - You must learn and practice safe use of all controls and indicators before you operate the unit or before you do repair or maintenance procedures.
- Before you operate the unit in reverse, you must make sure the area behind the unit is clear of other people, vehicles or other obstructions.

⚠ WARNING

A unit that needs service or repair can malfunction and create a dangerous condition. A part failure during operation can cause serious injury or death to a person or damage to the unit. Repair or replace any failed or defective part immediately.

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WARRANTY CLAIMS AND INQUIRIES

The HEIL ENVIRONMENTAL WARRANTY STATEMENT is printed on the inside, back cover of this manual. Should a failure occur that is covered by this warranty, contact the nearest Heil dealer for warranty repair unless otherwise authorized by Heil.

For all parts, warranty claims, and inquiries, please give the dealer or service center the unit's model and serial number located on the body serial plate. See **Serial Plate Location** page for the location of the body serial plate.

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CONTACT INFORMATION

Customer Care
Phone: 866-275-4345

Technical Service
Phone: 866-310-4345

Parts Central
Phone: 800-528-5308

4301 Gault Avenue North
Fort Payne, AL 35967
www.heil.com

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MODELS

The Liberty has one body model, the dump model. See the figure below.

The dump model has one basic configuration, a unit with a lift arm.

You use the lift arm to pick up containers, lift the containers and dump the refuse into the hopper. You then use the lift arm to put the refuse container on the ground.

The unit uses a Packer Panel, which is a paddle, and two cylinders to sweep the refuse from the hopper into the body and compacts the refuse. The two cylinders continuously move the paddle, alternating from the left to right directions and right to left directions, except when the manual pack mode is selected. During the manual pack mode, the operator selects a paddle direction, left or right, to move the paddle manually.

The unit does not have an eject mode. You remove the refuse from the body by raising the tailgate and then raising the body.

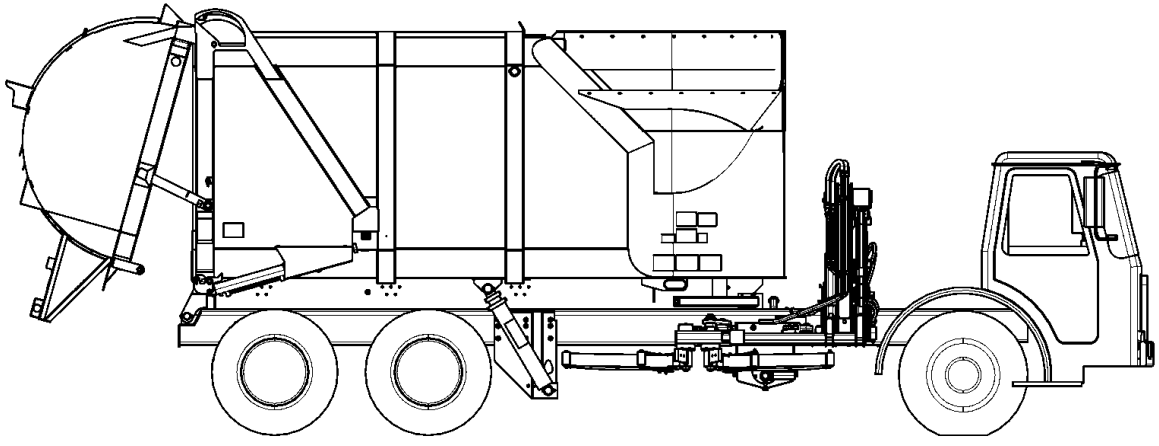


Figure 1. Dump Model

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SERIAL PLATE LOCATION

You determine the sides of the unit by facing the direction of forward travel. The left side is the “streetside” and the right side is the “curbside”. The figure below shows the location of the serial plate on the streetside of the unit’s body and lift arm serial plate. See the next page for a description of the information that is on the serial plate.

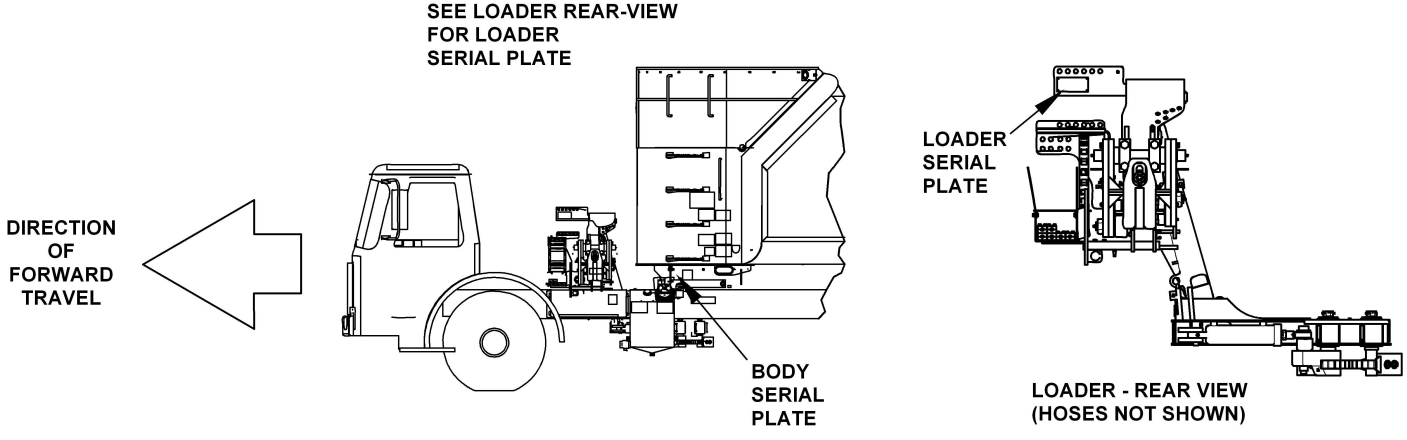


Figure 2. Serial Plate Location

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READING THE SERIAL PLATE

The serial plate is the “birth certificate” of the unit. See the figure below.

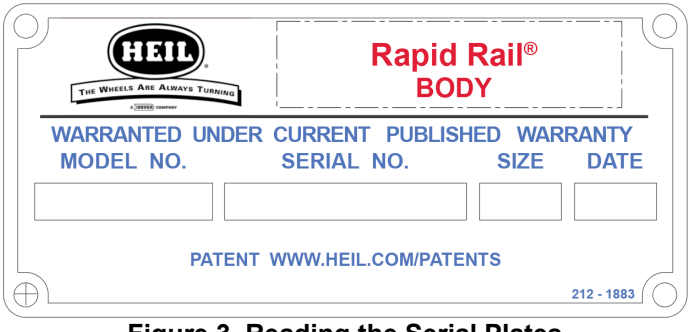


Figure 3. Reading the Serial Plates

Information stamped in the boxes on the serial plate indicates:

Model number:
612-nnnn (“n” is any single-digit number)

Unit’s unique serial number

Body size (cu. yd.)

Date of manufacture (last number of the year followed by the number of the day of the year, e.g. J078 is year 2018 and the 78th day of 2018).

NOTICE

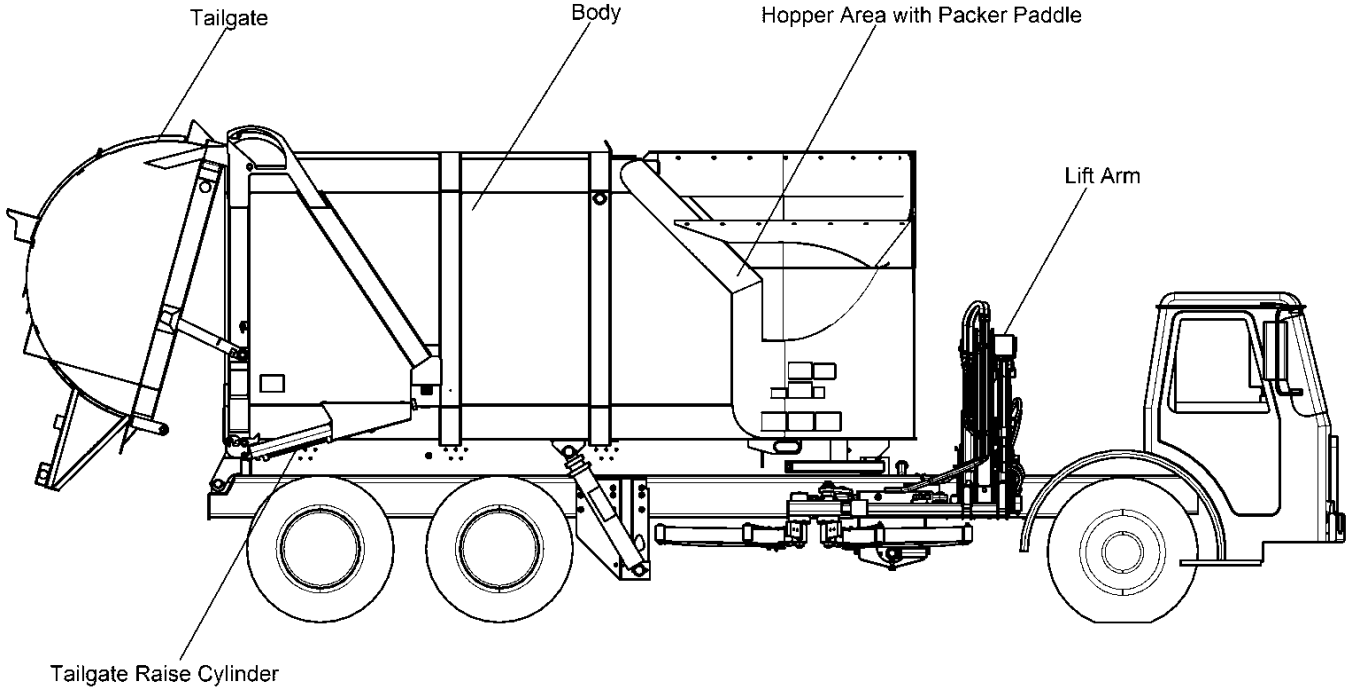
The code for the year of manufacture is in accordance with FMVSS 115. See the following table.

Year of Manufacture			
Year Code	**Year**	**Year Code**	**Year**
5	2005	F	2015
6	2006	G	2016
7	2007	H	2017
8	2008	J	2018
9	2009	K	2019
A	2010	L	2020
B	2011	M	2021
C	2012	N	2022
D	2013	P	2023
E	2014	R	2024

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PRODUCT NOMENCLATURE

The figure below shows the major components and their typical location on the unit. See the following pages for brief descriptions of each component shown below.



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GLOSSARY

TERM	DEFINITION
accident	An incident that results in unintended harm.
AutoPack™	A feature on all units that allows an operator to press one button to automatically complete one extend and retract cycle of the packer to compress the refuse.
bin	The refuse collection container
body	The complete body assembly or the area of the body where the refuse is stored.
boiling	Refuse material rising from a compacted base to the unit's roof.
bridge	Refuse material densely compacted on a bottom layer with refuse material loose or lightly compacted on a top layer.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
collapsed position	The fully retracted position of a cylinder
Cortex Controller™	Heil Electronic Body Controller (Half/Pack®, Half/Pack® (featuring Odyssey® Controls), DuraPack® Python®, DuraPack® 7000, MultiPack®, Rapid Rail®, STARR® System and Liberty™ units only).
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
extend/EXTEND	Make a cylinder rod move out its base
fall-back	Material loaded in the body that drops from its initial compacted position into the hopper
fouling	Damage to the lid(s) of the refuse bins (containers) that interferes with unloading the refuse
Grabber	The entire grabber assembly or the grabber arms.
GRIP	The command to close the grabber arms around a refuse container.
harm	An action that causes death, injury or property damage.
hazard	A potential source of harm.

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GLOSSARY

TERM	DEFINITION
hopper	The loading chamber of the unit in front of the packer panel where you dump the refuse material.
illuminate	Make a lamp shine light (the lamp is on).
incident	An unintended and undesired event that has the potential to harm.
interlock	A safety mechanism that disables a function or action.
LATCHED	The side access door is secured closed. / The condition when the tailgate is fully CLOSED, thereby locking the tailgate.
Lift Arm	That part of the Liberty™ loader that moves IN, OUT, UP, DOWN and PIVOTS.
LOCK	Command to use the tailgate lock/unlock switch and lock the tailgate lock cylinders.
lower/LOWER	Move the body or tailgate down. / Command to move the lift arms, forks, body or tailgate down.
may	You are allowed to do the action, but it is not mandatory. It is understood to be permissive.
must	The action is mandatory.
NOTICE	Alerts you to practices not related to personal injury, such as damage to the unit or other equipment.
off/OFF	When a light or lamp does not illuminate / The position of a switch or other control to stop a function
on/ON	When a light or lamp illuminates / The position of a switch or other control to start a function
operator	Any person who uses the unit and its equipment. One who controls the operation of various unit accessories and mechanisms, loads material, performs functions such as operating the loader, cart tipping and packing of wastes or recycled products, and who may also drive the unit along the route during the collection process. The operator may also be the driver.
paddle	For Rapid Rail®, STARR® System, and Liberty™ continuous pack units, packer panel is a 180°

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GLOSSARY

TERM	DEFINITION
	revolving paddle.
PN	Part Number
PTO	Power Takeoff
raise/RAISE	Move the lift arm, body or tailgate up / Command to move the lift arm, body or tailgate up
retract/RETRACT	Make a cylinder rod go into its base / Command to move the packer panel towards the hopper
RPM	Revolutions Per Minute
should	The action is advised.
side access door	The side access door is located on the street side of the unit. This is the preferred access into the body. ALWAYS **Lock-Out/Tag-Out** 47 the unit BEFORE entering the body.
unit	The Heil Liberty™ refuse collection vehicle referred to in this manual.
UNLATCHED	The side access door is not closed or secured.
UNLOCK	Command to use the tailgate lock/unlock switch and unlock the tailgate lock cylinders
WARNING	Indicates a hazardous situation, which if not avoided, could result in death or serious injury.

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SECTION 2
SAFETY MESSAGES AND DECALS

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PREVIEW

Read this section to learn about:

- General safety precautions and safety precautions for the safe operation and maintenance of the unit
- The safety precautions for NOT towing another vehicle or machine
- Safety decals on the unit.

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PRECAUTIONARY STATEMENTS

Read this entire manual and especially this safety section before you operate the vehicle. Failure to follow these important precautions could result in serious injury, death, or property damage.

This safety alert symbol indicates important safety messages in this manual and on safety decals attached to the equipment. Make sure you read all of these messages and follow the instructions and precautions.

In the general text of the manual and in the safety labels attached to the product, signal words indicate the type and seriousness of risk that you could encounter if you do not follow the precautions. The signal words and their definitions follow:

DANGER

DANGER indicates a hazardous situation which, if not avoided, WILL result in DEATH or SERIOUS INJURY.

WARNING

WARNING indicates a hazardous situation which, if not avoided, COULD result in DEATH or SERIOUS INJURY.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, COULD result in MINOR or MODERATE INJURY.

NOTICE

NOTICE addresses practices not related to personal injury, such as property damage or damage to the equipment.

The following pages provide a summary of some of the more important safety precautions that are in this manual. There are additional safety precautions in other sections of this manual that are not contained in this section. You must also read, understand and follow those messages.

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GENERAL SAFETY PRECAUTIONS

- **DO NOT** operate the unit under the influence of alcohol or drugs or when extremely tired or when you are not alert, as this may result in an accident that can cause serious injury or death.
- **DO NOT** operate the unit unless you have the proper training and vehicle operator license.
- **ALWAYS** carry and maintain a fire extinguisher and first aid kit in the unit. **MAKE SURE** you know how to use them.
- **CLEAN AS NECESSARY** any safety decals that you cannot read at a safe viewing distance from the hazard because of dirt. If any decals are illegible from damage or wear, **REPLACE** them **IMMEDIATELY**. Get decals from your Heil dealer or Heil.
- **DO NOT** use this refuse collection vehicle to TOW another vehicle or equipment. It **IS NOT DESIGNED** or equipped to tow another vehicle or other equipment. Towing another vehicle or equipment may result in injury or death to the operator or other people or damage to the unit.
- **MAKE SURE** all individuals are clear of any moving parts, mechanisms or components of the unit before you operate the controls.
- **DISENGAGE** the PTO or PUSH the SYSTEM POWER switch so the pump shuts off when you are not using the unit, when you are repairing the unit, when you are working on the unit, or when traveling in the unit for longer than two minutes.
- ENGAGE the PTO or PULL the SYSTEM POWER switch ONLY when you are on route OR as necessary to perform repairs.
- When the unit is stored or not in use, you **MUST** do the following:
 - SET ALL lift cylinders (including the body raise cylinders) to the collapsed position.
 - For units with manual transmissions, DISENGAGE the PTO and PUSH the PUMP switch so it shuts off the pump.
 - For units with automatic transmissions PUSH the SYSTEM POWER switch so the pump shuts off.
 - **REMOVE** the key from the ignition. This helps prevent tampering by unauthorized persons.
 - Refer to **Lock-Out/Tag-Out Procedure** 47.
- You must be attentive at all times while you operate the controls and be ready to stop or reverse the function if necessary.

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BEFORE OPERATING THE EQUIPMENT

- **DO NOT** operate or service this machine until you are fully trained and have read and understand this entire manual.
- **NEVER** operate the unit UNLESS you are fully knowledgeable of all control functions. See the **Controls, Switches, and Indicator Lights** 51 of this manual.
- **MAKE SURE BEFORE** you operate the vehicle or its controls that all individuals are at a safe distance away from the unit.
- **DO NOT** operate the unit when it needs service or repair.
- **DO A VISUAL CHECK** at the beginning of each shift of the unit and run it through several cycles to find fluid leaks, broken, missing or malfunctioning, and excessively worn components (including hoses). See the **Daily Checklist section** 77 of this manual. If you find leaks, broken, missing or malfunctioning parts, immediately stop and get the condition repaired or serviced.

USE PERSONAL PROTECTIVE EQUIPMENT

- **ALWAYS WEAR** the proper safety equipment, such as hard hats, safety shoes, protective eye wear, reflective clothing and gloves. Confirm with the owner/operator that you are using proper safety equipment.
- **WEAR PROPER EYE PROTECTION** and avoid contact with oil if possible whenever you work on or about hydraulic lines or components. **NEVER** check for oil leaks with your bare hands.

BEWARE OF OVERHEAD OBSTRUCTIONS

- **KNOW** the clearance required for **ALL** overhead obstructions (such as viaducts and bridges) that you may encounter when you drive the unit. See the decal in the chassis cab for your unit's overall height.
- **NEVER** drive the unit under any overhead obstruction of unknown height clearance.
- Become familiar with your route. Be aware of all overhead trees and obstructions that could cause problems during refuse collection.
- **CHECK** the height of the unit after you do any modifications to the chassis suspension. Any chassis suspension modification may change the height of the unit. See Tables 1 and 2.

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- **LOOK UP AND LIVE. MAKE SURE** there is enough clearance between a lowered or raised container and overhead power lines. It is not necessary for the unit or container to touch the electric cable for the electricity to pass through the unit. See Tables 1 and 2.
- **STAY IN THE CAB** and **KEEP AWAY FROM ALL METAL PARTS OF THE UNIT** if the unit does touch a power line. **STAY IN THE UNIT UNTIL HELP ARRIVES.**

OVERHEAD CLEARANCES

NOTICE

Table 1 and 2 is in accordance with OSHA 29CFR 1910.333. (Also refer to ANSI Standard B30.5-2004, 5-3.4.5.) If local rules and laws require more clearance, you must follow those.

Table 1. Overhead Clearances When Operating the Unit

Voltage of Electric Line	Minimum Clearance
50,000 or less	10 feet (3 m)
Above 50,000 to 200,000	15 feet (4.6m)
Above 200,000 to 350,000	20 feet (6.1 m)
Above 350,000 to 500,000	25 feet (7.6 m)
Above 500,000 to 750,000	35 feet (10.7 m)
Above 750,000 to 1,000,000	45 feet (13.7 m)

Table 2. Overhead Clearances When Driving the Unit

Voltage of Electric Line	Minimum Clearance
750 or less	4 feet (1.2 m)
Above 750 to 50,000	6 feet (1.8 m)
Above 50,000 to 345,000	10 feet (3 m)
Above 345,000 to 750,000	16 feet (4.9 m)

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Table 2. Overhead Clearances When Driving the Unit

Voltage of Electric Line	Minimum Clearance
Above 750,000 to 1,000,000	20 feet (6.1 m)

LOADING REFUSE INTO THE UNIT

- **YOU MUST BE ATTENTIVE** at all times when you load refuse and be ready to stop or reverse the function in use if necessary.
- **ALL PERSONS MUST STAND CLEAR** when the tailgate is in motion and during the unloading cycle. **MAKE SURE** no one stands under or crosses under a raised tailgate.
- **LOOK UP AND LIVE**. Make sure there is enough clearance between a raised container and overhead power lines. Refer to Tables 1 and 2.

UNLOADING

- **MAKE SURE** the unloading area is clear of all personnel.
- **ALL PERSONS MUST STAND CLEAR** when the tailgate is in motion and during the unloading cycle. **MAKE SURE** no one stands under or crosses under a raised tailgate.
- While you raise the body, be attentive at all times and be ready to stop or reverse the function if necessary.

WHEN WORKING IN OR AROUND THE VEHICLE

- **MAKE SURE** the unit is in **Lock-Out/Tag-Out** 47 condition **BEFORE** you work in or around the unit.
- **NEVER** put any part of your body between a raised body and the chassis frame unless the frame is securely propped up. Read and follow the instructions for **Propping the Body.**
- **DO NOT** go under the chassis or enter the body area unless the unit is locked-out. To lock-out the unit, stop the engine, apply the brakes and make sure the brakes hold and work properly, chock all wheels, remove the keys from the cab, and place a lock-out tag on the steering wheel. See **Lock-Out/Tag-Out Procedure** 47.

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TOWING OF ANY EQUIPMENT

- Heil DOES NOT recommend that you tow any kind of equipment with the unit. The unit was NOT DESIGNED nor intended for towing.

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DECALS

The following pages show the DANGER, WARNING and CAUTION decals and list the reflective safety materials that are on the vehicle. See the Parts and Service Manual for the location and part numbers of all decals on the unit.

NOTICE

Replace any decal with a new decal if the old decal is lost, destroyed, painted over or cannot be read. When you replace a part that had decals, make sure you install new decals on each new part. Decal part numbers can be found below and in the Parts Manual. You can purchase replacement decals from your **Heil Dealer** or from the **Heil Parts Central**, 800-528-5308.

REFLECTIVE SAFETY MATERIALS

See the Parts and Service Manual for the location and part numbers of the reflective safety materials on the unit.

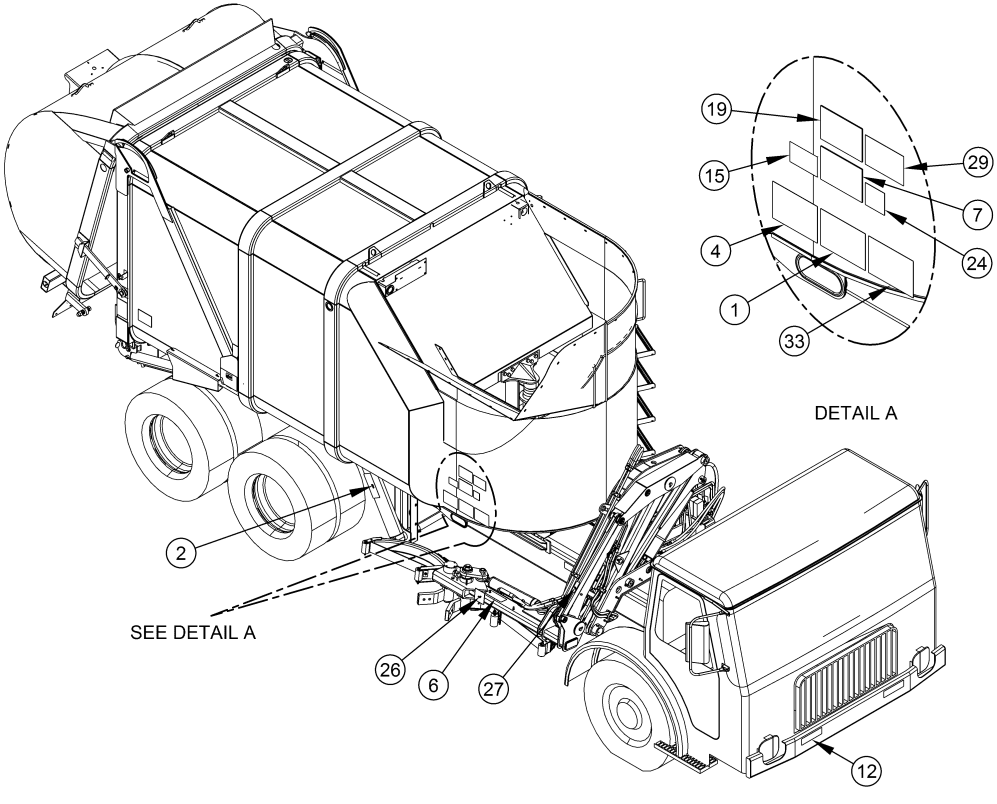
NOTICE

Replace any safety material with new safety material if the old safety material is lost, destroyed, painted over or cannot be seen. When you replace a part that had safety material on it, make sure you install new safety material on the new replacement part. See the Parts and Service Manual for all part numbers and location of the safety materials.

You can purchase replacement decals from your **Heil Dealer** or from the **Heil Parts Central**, **800-528-5308**.

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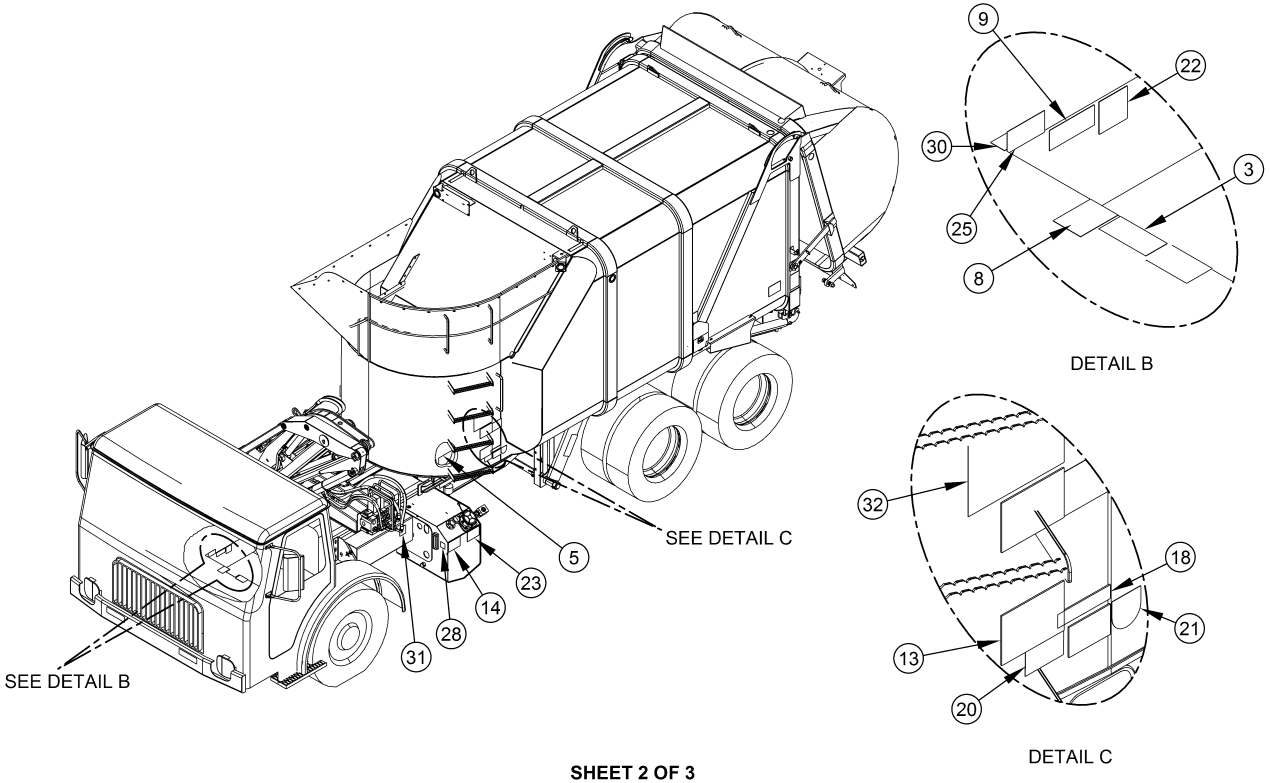
DECAL PLACEMENT



SHEET 1 OF 3

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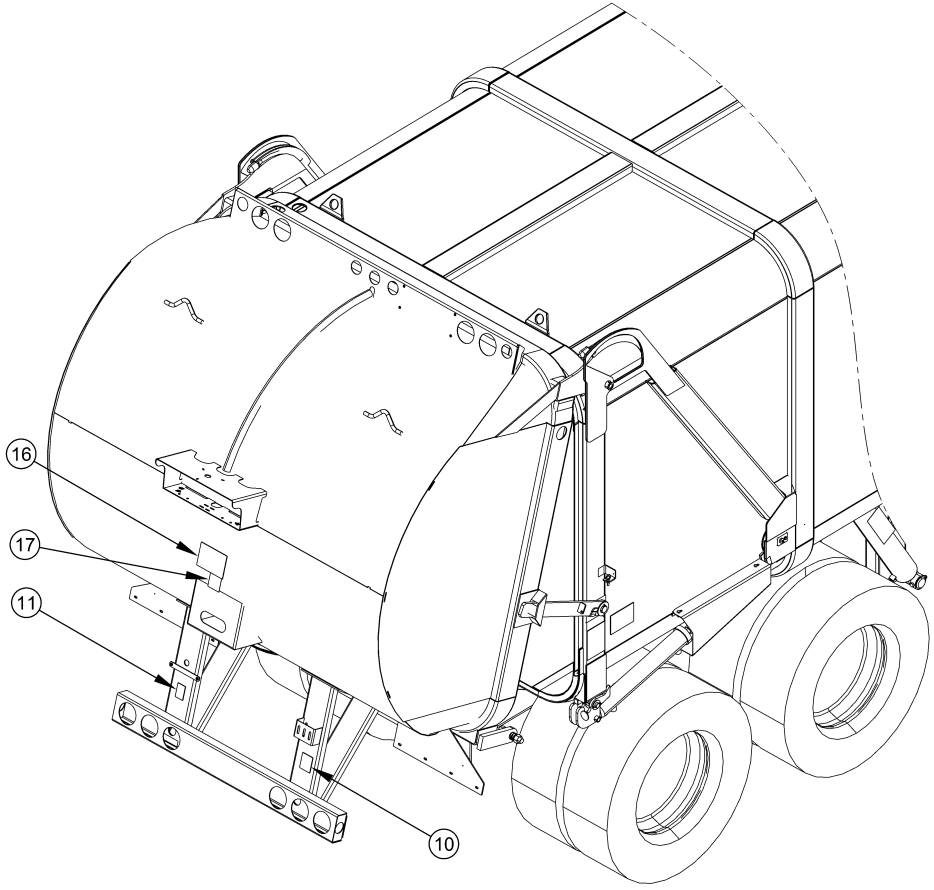
DECAL PLACEMENT (CONTINUED)



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DECAL PLACEMENT (CONTINUED)



SHEET 3 OF 3

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DECAL PLACEMENT (CONTINUED)

ITEM	PART NO.	DESCRIPTION	EFF	QTY
-	212-2887	KIT, Decal	-	REF
1	212-0980	DECAL, Danger, Stay Clear, Container Off Ground	-	1
2	212-1103	DECAL, Danger, Body Elevated	-	2
3	212-1104	DECAL, Danger, Body Elevated, Small	-	1
4	212-1242	DECAL, Danger, Stand Clear, Automated Lift Device In Motion	-	1
5	212-1329	DECAL, Instruction, Body Prop	-	2
6	212-1330	DECAL, Warning	-	1
7	212-1542	DECAL, Lubrication Guide	-	4
8	212-1584	DECAL, Overall Height	-	1
9	212-1626	DECAL, Danger, Tailgate Raise, Before Body	-	1
10	212-1631	DECAL, Warning, Bumper, Not Step	-	1
11	212-1634	DECAL, Danger, Stand Clear	-	1
12	212-1764	DECAL, Danger, Under Chassis, Stop Engine	-	4
13	212-1781	DECAL, Caution, Enter Body, Stop Engine	-	1
14	212-1782	DECAL, Hydraulic Oil Only	-	1
15	212-1783	DECAL, Warning, Operator’s Manual	-	3
16	212-1801	DECAL, Danger, Stand Clear	-	3
17	212-1820	DECAL, Danger, Towing, In Cab	-	1
18	212-1841	DECAL, ANSI Specifications	-	1
19	212-1899	DECAL, Danger, Stay Clear When Container Off the Ground	-	1
20	212-1914	DECAL, Caution, Ladder	-	1
21	212-1915	DECAL, Warranty Parts	-	1
22	212-1918	DECAL, Safety Instructions	-	1
23	212-2207	DECAL, Warning, Hydraulic Oil Only	-	1
24	212-2220	DECAL, Danger	-	1
25	212-2221	DECAL, Danger	-	1
26	212-2228	DECAL, Proximity Switch, Adjustment	-	1
27	212-2232	DECAL, Danger, Stay Clear	-	1
28	212-2275	DECAL, Oil Level	-	1
29	212-2689	DECAL, Flag	-	2
30	212-2738-010	DECAL, Auto/Manual Mode, Python lift	-	1
31	212-2875	DECAL, Battery, Warning	-	1

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DECAL PLACEMENT (CONTINUED)

ITEM	PART NO.	DESCRIPTION	EFF	QTY
32	212-2884	DECAL, Body Lubrication	-	1
33	212-2920-002	DECAL, Python Loader Lubrication	-	1
34	212-3269	DECAL, Tailgate Prop Operation	-	2

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DECAL IMAGES



Figure 4. Danger: Stay clear container off ground, PN 212-0980

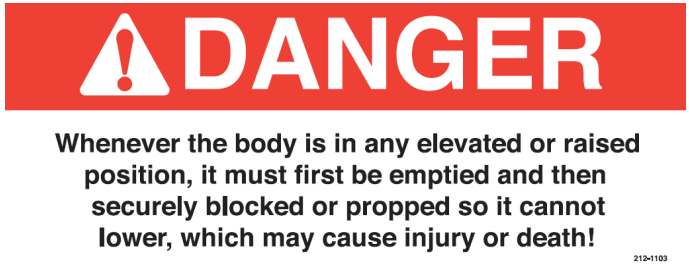


Figure 5. Danger: Elevated body emtpied and propped, PN 212-1103



Figure 6. Danger: Stand clear automatic lift, PN 212-1242

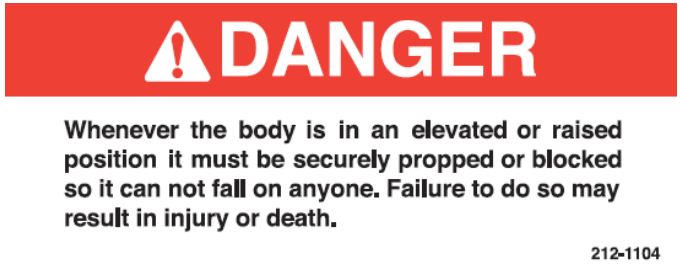


Figure 7. Danger: Elevated body propped, PN 212-1104

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DECAL IMAGES (CONTINUED)

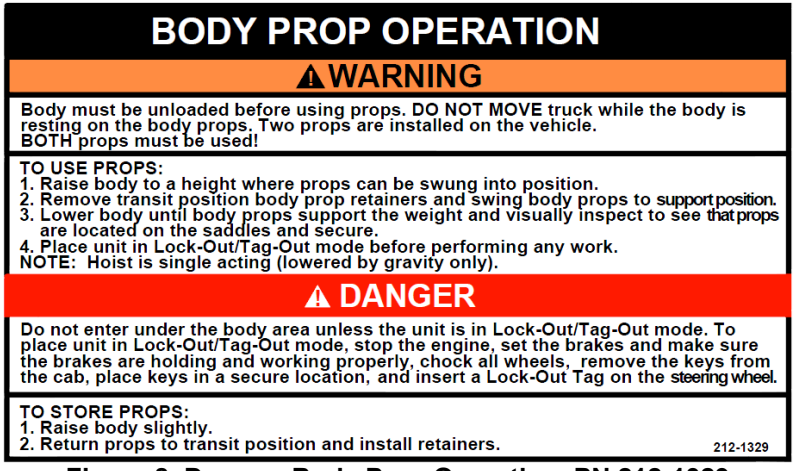


Figure 8. Danger: Body Prop Operation, PN 212-1329



Figure 9. Warning: Overall height, PN 212-1584



Figure 10. Warning: Keep away from gear, PN 212-1330



Figure 11. Danger: Raise Tailgate before Raising Body, PN 212-1626

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DECAL IMAGES (CONTINUED)



Figure 12. Warning: Never use bumper as step, PN 212-1631



Figure 13. Warning: Tank is pressurized, PN 212-2207



Figure 14. Danger: Stand clear tailgate, PN 212-1634



Figure 15. Danger: Do not enter under chassis, PN 212-1764

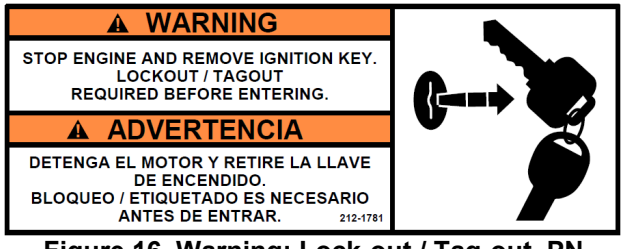


Figure 16. Warning: Lock-out / Tag-out, PN 212-1781

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DECAL IMAGES (CONTINUED)



Figure 17. Warning: Operations Manual, PN 212-1783

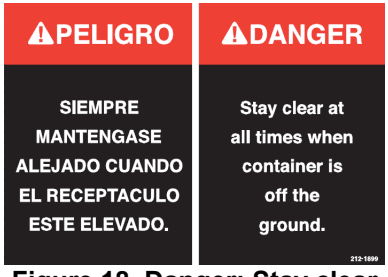


Figure 18. Danger: Stay clear container off groud, PN 212-1899



Figure 19. Danger: Do not use for towing, PN 212-1820

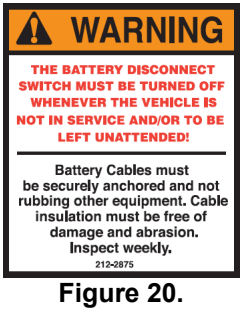


Figure 20. Warning: Battery disconnect switch, PN



Figure 21. Caution: Ladder safety/balance, PN 212-1914

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DECAL IMAGES (CONTINUED)

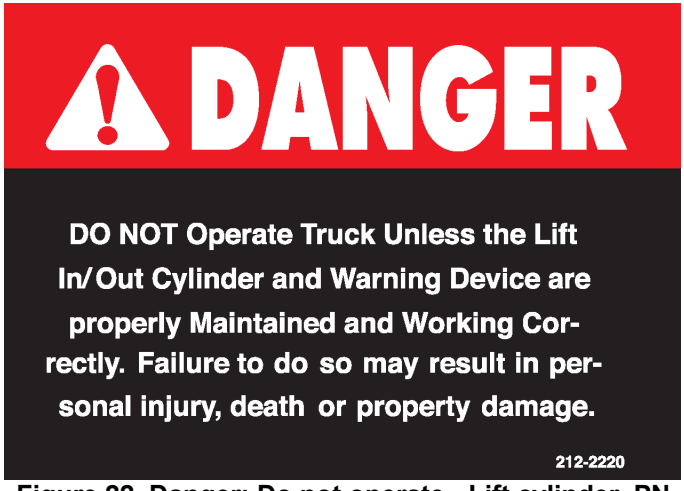


Figure 22. Danger: Do not operate - Lift cylinder, PN 212-2220

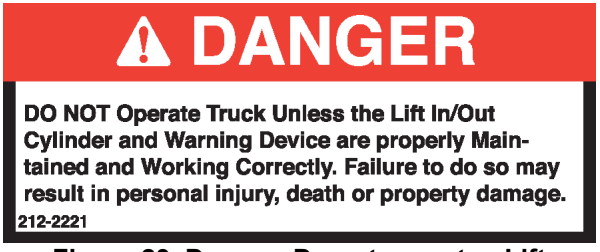


Figure 23. Danger: Do not operate - Lift cylinder, PN 212-2221



Figure 24. Danger: Stay clear container off ground, PN 212-2232

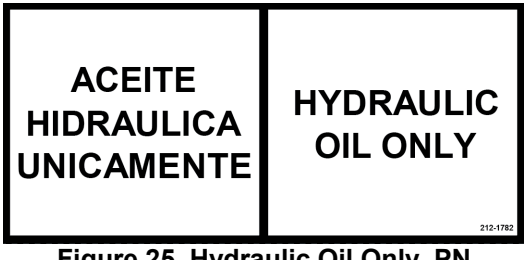


Figure 25. Hydraulic Oil Only, PN 212-1782

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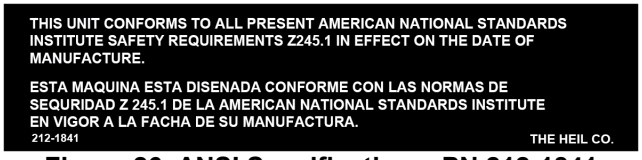


Figure 26. ANSI Specifications, PN 212-1841



Figure 27. Warranty Parts, PN 212-1915

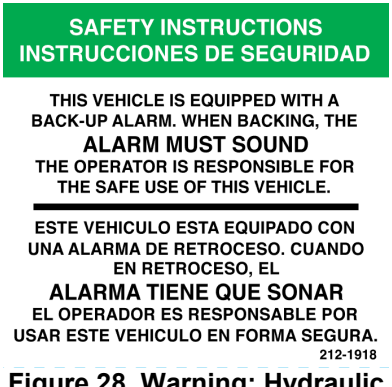


Figure 28. Warning: Hydraulic Oil Only, PN 212-1918

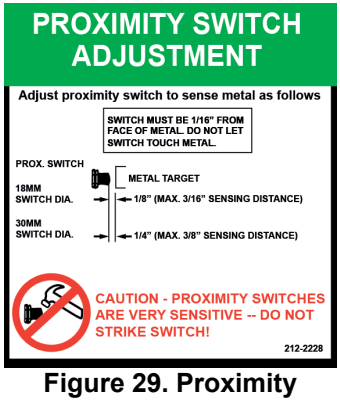


Figure 29. Proximity Switch, Adjustment, PN 212-2228

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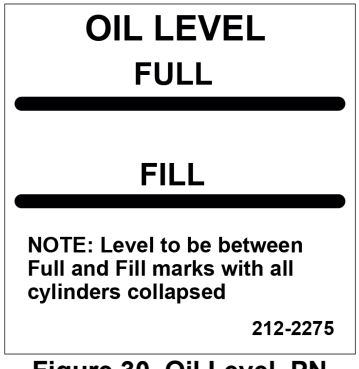


Figure 30. Oil Level, PN 212-2275



Figure 31. Flag, Made in USA, PN 212-2689

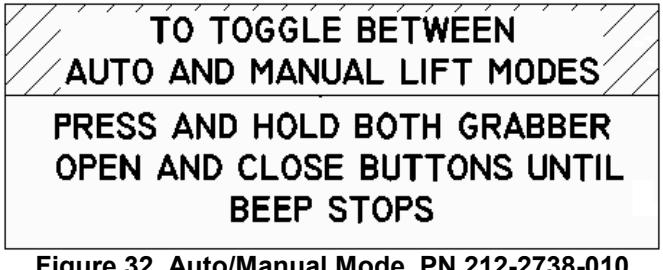


Figure 32. Auto/Manual Mode, PN 212-2738-010

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DECAL IMAGES (CONTINUED)



Figure 33. Danger: Stand clear tailgate, PN 212-1801

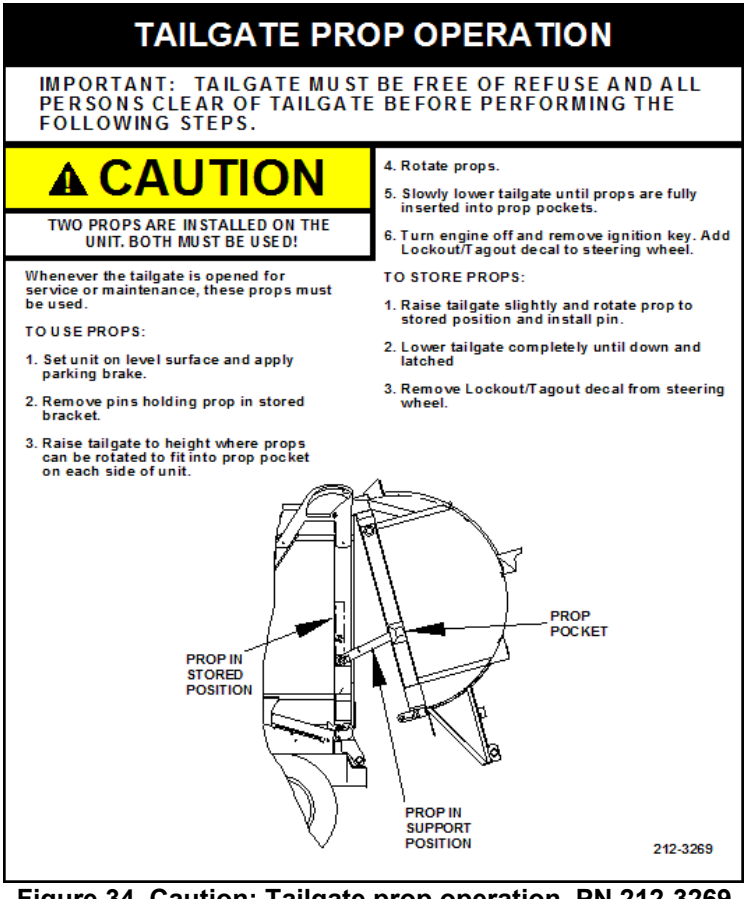


Figure 34. Caution: Tailgate prop operation, PN 212-3269

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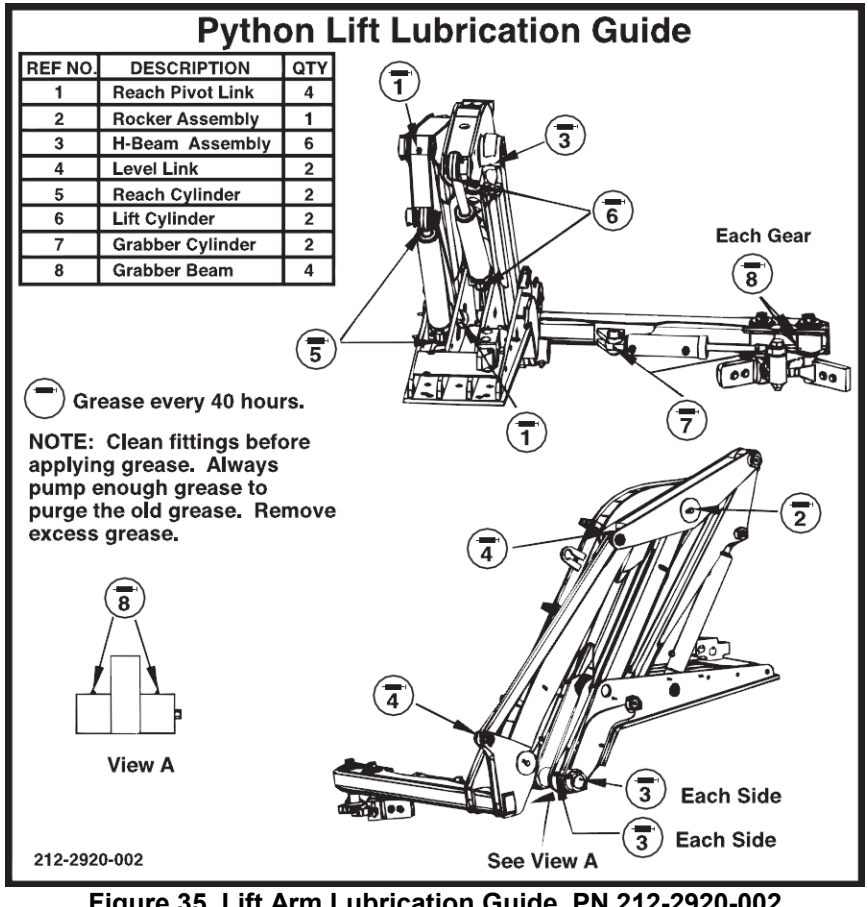


Figure 35. Lift Arm Lubrication Guide, PN 212-2920-002

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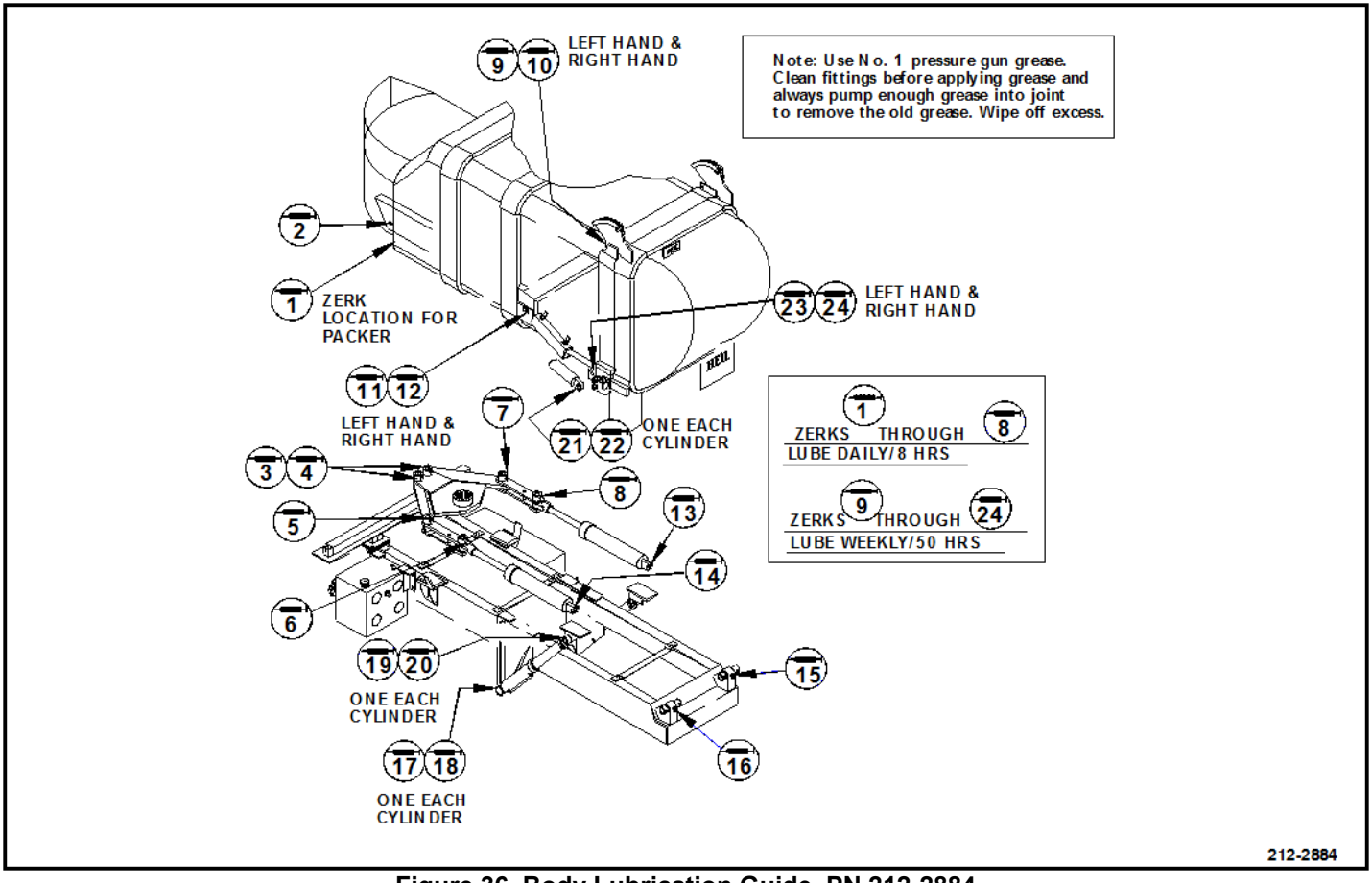


Figure 36. Body Lubrication Guide, PN 212-2884

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CARE OF DECALS

It is important that the decals are properly cleaned to make sure that they are readable and do not come off the unit. Use the following steps to clean the decals.

General Instructions

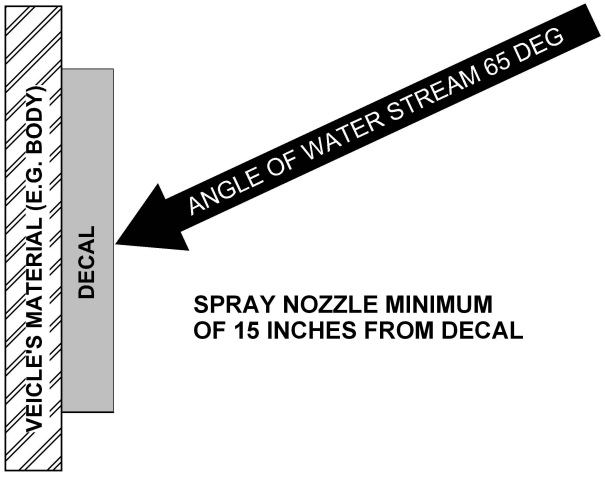
- Wash the decals with a blend of mild car wash detergent and clean water.
- Rinse with clean water.
- Let the vehicle air-dry or dry with a micro-fiber cloth.
- Do not allow fuels to stay in contact with the decal for an extended period of time. Remove the fuel contamination as quickly as possible.
- Do not use carnauba-based wax over the decals.
- Do not use a mechanical brush while washing the decals.

Pressure Washer Precautions

- Pressure washing can cause damage to decals. It can cause the edges of the decals to lift and peel the decal away from the unit. Over time, the decal can fade, crack or chip away.
- See the following figures for correct and incorrect methods of pressure washing.
- Use pressure washing only when other cleaning methods are not effective. If you use a pressure washer, use the following precautions.
 - Spray nozzle opening: 40° wide pattern
 - Spray angle: 65° from vehicle's body
 - Distance of nozzle to decal: 15" minimum
 - Water pressure: <= 800 psi
 - Length of time: not more than 30 sec.
 - Do not use sharp angles to clean the decals – this can lift the decals from the unit.
 - NEVER use a "turbo pressure nozzle".

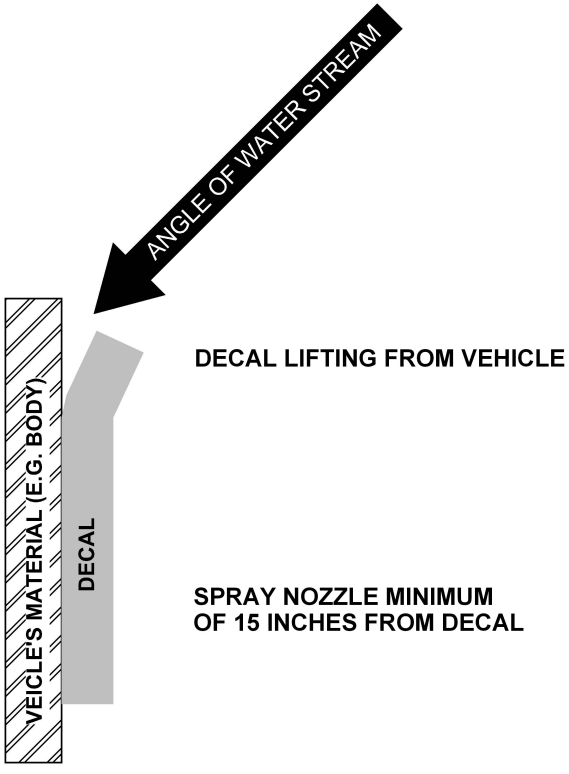
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PRESSURE WASHER TECHNIQUE



RECOMMENDED TECHNIQUE

Figure 37. Recommended Technique



INCORRECT TECHNIQUE

Figure 38. Incorrect Technique

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ALTERNATIVE CLEANING PROCEDURE

When normal cleaning procedures do not remove difficult debris from the decals, try the following:

⚠ WARNING

Isopropyl alcohol is flammable and is harmful to eyes and skin. Keep isopropyl alcohol away from heat or open sources of ignition. Flush eyes and skin with water for 15 minutes after contact. Seek immediate medical help.

- Spot clean the decal with Isopropyl Alcohol and a micro-fiber cloth (rag).
- If these methods do not work on a problem area, call a Heil Dealer or Heil Customer Service.

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SECTION 3
LOCK-OUT/TAG-OUT PROCEDURE

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PREVIEW

Read this section to learn about the proper Lock-Out/Tag-Out procedures.

You MUST Lock-Out/Tag-Out a unit BEFORE:

- You enter the body
- Do maintenance or repair procedures.

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LOCK-OUT/TAG-OUT PROCEDURE

NOTICE

Always use your employer's Lock-Out/Tag-Out procedures. If your employer does not have Lock-Out/Tag-Out procedures, use the procedures that follow. Contact your supervisor or Heil Technical Service if you have any questions about Lock-Out/Tag-Out procedures.

Put the unit in a Lock-Out/Tag-Out mode:

- BEFORE you enter the unit's body.
- BEFORE you perform maintenance, repair, or cleaning procedures on the unit.

☑ Follow These Steps:

1. APPLY the brakes. MAKE SURE the brakes do not let the unit move and they work properly.
2. Chock all wheels.
3. **SET the tailgate props** when you raise the tailgate for service, maintenance or cleaning.
4. If equipped, **SET the body props** when you raise the body for service, maintenance or cleaning.
5. When there are in-cab controls, turn the ignition switch to ON, then:
 a. Move the switches of the hydraulic controls. This relieves the pressure in the cylinders.
 b. Turn the ignition switch to OFF.
6. When there are no in-cab controls, move the outside control levers to relieve the pressure in the cylinders.
7. Put a LOCK-OUT/TAG-OUT tag onto the steering wheel.
8. Remove the ignition key from the cab, lock the vehicle, and put the key in a secure location.



Figure 39. Lock-Out/Tag-Out Tag (Do Not Operate Tag)

NOTICE

You can order Lock-Out/Tag-Out tags (Part No. 212-1586) through your Heil dealer or through Heil.

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NOTES:

SECTION 4
FEATURES, CONTROLS, SWITCHES, AND INDICATOR LIGHTS

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PREVIEW

Read this section to learn about the operation of the in-cab and outside controls, switches, buttons, and indicator lights.

NOTICE

The location and appearance of the controls may be different than those shown in this manual. Make sure you know the location of the controls and the how you operate the controls on your unit before you use the vehicle.

This section tells you:

- Learn about the unit's features and operation specifications
- The in-cab cab controls, switches and buttons
- How the in-cab controls work
- The in-cab indicator lights available
- The outside controls and how they work

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FEATURES

InSight™ Diagnostic Display

The Cortex Controller™ uses the Insight™ Diagnostic Display for displaying the current status of Input/Output, Engine speed, Temperatures, etc. This can also be used for configuring or selecting different options in the Cortex Controller.

For more information on the Insight Diagnostic Display, refer to **InSight Diagnostic Display** 62 and **Service Manual Body Controller Software section**.

Auto-Lift Mode

Auto-Lift Mode is standard on all Heil Automated Side Loaders. While in Auto Mode, the lift will automatically retract and dump when holding the grabber close push button.

To toggle the control between Auto and Manual Lift Modes, press and hold both grabber open and close buttons simultaneously until the in cab alarm stops sounding.

Refer to **Lifting and Loading Refuse with the Lift Arm** for more information.

Select-O-Pack™

Select-O-Pack is a standard feature on all Cortex Controller™ controlled Heil Automated Side Loaders. This feature automatically cycles the Auto-Pack after a predetermined number of lift cycles.

Refer to **Operation Specifications** and **Compacting the Load** for more information.

To set the number of lift cycles before automatic operation of the packer, follow these steps.

1. Turn the SYSTEM POWER switch OFF.
2. Press and hold the packer retract button for five (5) seconds. The in-cab alarm will begin to sound on the fifth second.
3. Each additional activation of the retract button will allow one additional lift cycle before automatically packing the load. If no further activation's of the packer retract button is performed, the Select-O-Pack function will be disabled.
4. Turn SYSTEM POWER switch ON.

You can also pack the refuse manually any time after loading the refuse in the hopper. You can use the in-cab controls for the packer panel to compact the load again with a manual cycle.

Auto/Manual Pack Mode

Auto/Manual Pack Mode is a standard feature on all Cortex Controller™ controlled Heil products. While in Auto Mode, the packer will complete its cycle automatically with a momentary activation of the packer extend push button. While in manual mode, it will be necessary to hold the packer extend or retract buttons in order to keep the packer cycling.

Also while in manual mode, all control interlocks will be disabled. This is only intended for special occasions when an operator needs to bypass the control interlocks.

To toggle the control between Auto and Manual Pack Modes with the System Power (E-Stop) button ON, PRESS and HOLD the Packer Extend and Retract buttons simultaneously until the in cab alarm stops sounding.

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IN-CAB MAIN CONTROL PANEL

The In-Cab Main Control Panel can vary with different models of truck chassis. See the figure below for an illustration of a typical control panel. The control panels have labels or markings that identify each function and its operations. Make sure you are familiar with the control panel in your unit.

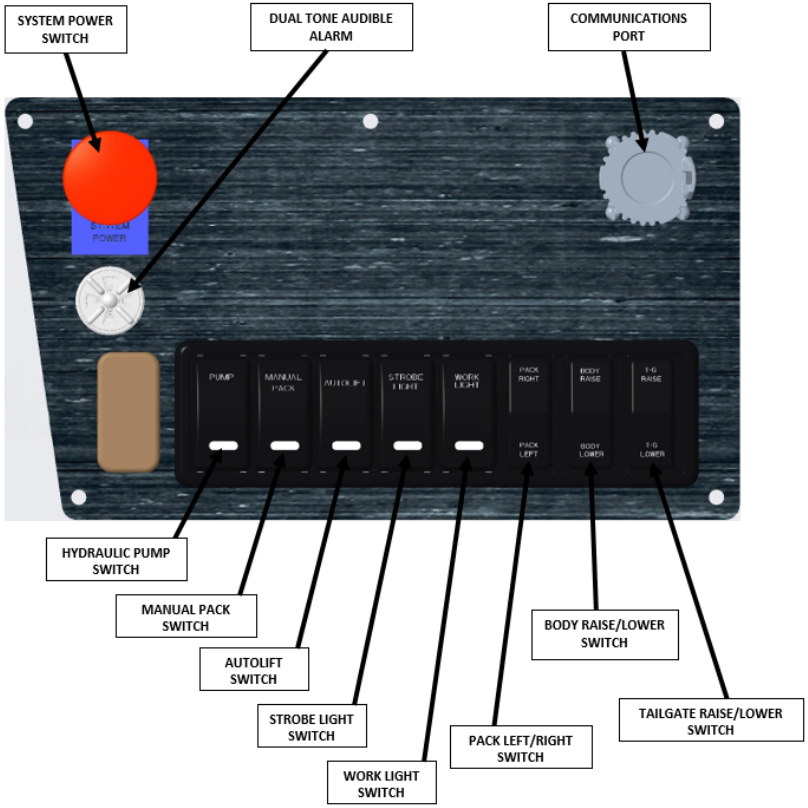


Figure 40. Main Control Panel

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Main Control Panel (Continued)

A. System Power Switch

a. Operates Cab Controller, Input 08.

b. Provides power to Cab Controller VBB-1 Supply Voltage for Outputs 00-07.

B. Dual Tone Audible Alarm

Alarm 1, Oscillating tone, sounds under the following conditions.

a. Tailgate Open

b. Body Raised.

Alarm 2, Continuous tone, sounds under the following conditions.

a. Control function interlocks.

b. Pack Pressure Switch activated.

c. Critical Fault Beep Codes.

d. Operator Warning Beep Codes.

C. Communications Port

a. Connect to and program Insight Diagnostic Display, Cab and Body Controllers, CAN Open network (CAN1).

b. Connect to chassis J1939 network (Chassis J1939).

c. Connect to Switch Banks and Body Controller, J1939 network (Device J1939).

D. Hydraulic Pump Switch

Momentary switch enables hydraulic pump system.

Text back light

a. Red - indicates Pump shutdown due to critical fault

b. Yellow - indicates system fault

c. Blue - no faults

Switch Indicator

a. Red – indicates Pump shutdown due to critical fault

b. Blue – indicates switch in on position pumps remain disabled

c. Green – indicates hydraulic system enabled

d. Off – indicates hydraulic system disabled

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Main Control Panel (Continued)

E. Manual Pack Switch

Maintained switch enables Manual Pack Mode.

Text back light always blue.

Switch Indicator

a. Green – indicates switch in ON position
b. OFF - indicates switch in OFF position

F. AutoLift Switch

Maintained switch enables AutoLift Mode.

Text back light always blue.

Switch Indicator

a. Green – indicates switch in ON position
b. Off – indicates switch in OFF position

G. Strobe Light Switch

Maintained switch enables all strobes.

Text back light always blue.

Switch Indicator

a. Green – indicates switch in ON position
b. Off – indicates switch in OFF position

Note: Strobe 1 (Smart Lights, 360 Strobe) - On with - Switch or Pumps Enabled or in Reverse.

Strobe 2 (Whelen Strobe, Muni Lights) - On with - Switch or Pumps Enabled or in Reverse and Turn Signals Off.

H. Work Light Switch

Maintained switch turn all work lights ON.

Text back light always blue.

Switch Indicator

a. Green – indicates switch in ON position
b. Off – indicates switch in OFF position

Note: Work Light 1 (Lift Flood, Hopper Flood) -On with – Switch.

Work Light 2 (Side Rev Flood) - On with - Switch and in Reverse.

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Main Control Panel (Continued)

I. Pack Left/Right Switch

Momentary switch for manual control of packer panel.

Text back light.

a. Green – indicates switch in ON position
b. Blue – indicates switch in OFF position

J. Body Raise/Lower Switch

Momentary switch for manual control of body hoist.

Text back light.

a. Green – indicates switch in ON position
b. Blue – indicates switch in OFF position

K. Tailgate Raise/Lower Switch

Momentary switch for manual control of tailgate.

Text back light.

a. Green – indicates switch in ON position
b. Blue – indicates switch in OFF position

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JOYSTICK CONTROLS

The joystick controls all of the lift functions and has three (3) push buttons to control the grabbers and pump. They are identified as follows.

A. Joystick Movements

The joystick can be moved forward, backward, sideways and at an angle for the different functions. See the figure the right for the different movements and the functions they control.

1. LIFT RAISE - Pull and hold joystick to raise the lift. Release the joystick to stop the movement of the lift.
2. LIFT LOWER - Push and hold joystick to lower the lift. Release the joystick to stop the movement of the lift.
3. LIFT RETRACT - Move joystick to the left and hold to retract the lift. Release the joystick to stop the movement of the lift.
4. LIFT EXTEND - Move joystick to the right and hold to extend the lift. Release the joystick to stop the movement of the lift.
5. DUMP - Pull joystick down and to the left and hold for lift to move in and up to dump the container. Release the joystick to stop the movement of the lift.



Figure 41. Joystick Movements/Functions

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JOYSTICK CONTROLS (CONTINUED)

B. 3 Push-Button Controls

The in-cab joystick has 3 push-buttons on the handle that controls the grabbers. See the figure below for the different functions of the push-buttons.

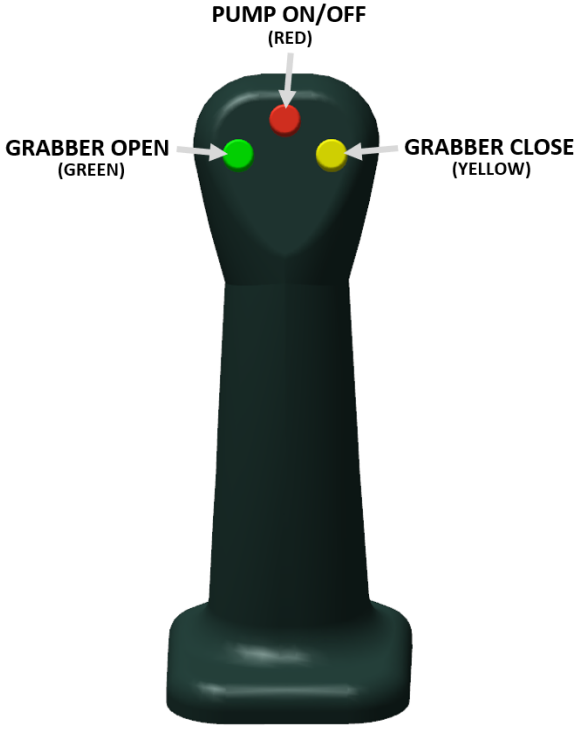


Figure 42. Joystick Button Functions

NOTICE

The power ON/OFF knob (red) must be pulled to the ON position and the pump switch depressed for the packer to work.

1. PUMP ON (RED) - DEPRESS and RELEASE button to engage the Hydraulic Pump. Depress button again to turn Pump OFF.
2. GRABBER OPEN (GREEN) - DEPRESS and HOLD button, when the grabbers get to the desired open position. Release the button.
3. GRABBER CLOSE (YELLOW) - DEPRESS and HOLD button until the grabbers are fully closed around the container. Release the button.

To toggle the control between Auto and Manual Lift Modes with the System Power (E-Stop) button ON, PRESS and HOLD the Grabber Open and Grabber Close buttons simultaneously until the in cab alarm stops sounding.

To toggle the control between Auto and Manual Pack Modes with the System Power (E-Stop) button ON, PRESS and HOLD the Packer Extend and Retract buttons simultaneously until the in cab alarm stops sounding.

For more information on Auto Modes, see **Features** 53.

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JOYSTICK CONTROLS (CONTINUED)

See the figure below for the in-cab joystick decal.

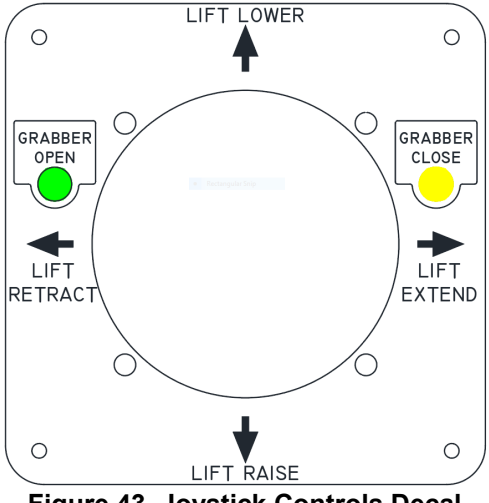


Figure 43. Joystick Controls Decal (212-2815)

Auxiliary Lift Controls

The optional remote lift controls, if equipped, are located in-cab beneath the curb side seat.



Figure 44. Optional Auxiliary Lift Controls

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BODY CONTROLLER

The Body Controller is mounted inside the street side hoist cylinder bracket.

Mounted with the body controller are the relays that control the hoist raise/lower and tailgate raise/lower.



Figure 45. Body Controller

LED COLOR	STATUS	DESCRIPTION
None	OFF	No Supply Voltage
Red/Green	1 Flash	Initialization
Red/Green	Flash @ .5 Hz	Communications Lost
Green	Flash @ 5 Hz	No Operating System Loaded
Green	Flash @ 2 Hz	Application Running (RUN MODE)
Green	Continuous	Application Stop (STOP MODE)
Red	Flash @ 5 Hz	Supply Voltage Low
Red	Flash @ 10 Hz	Fatal Error

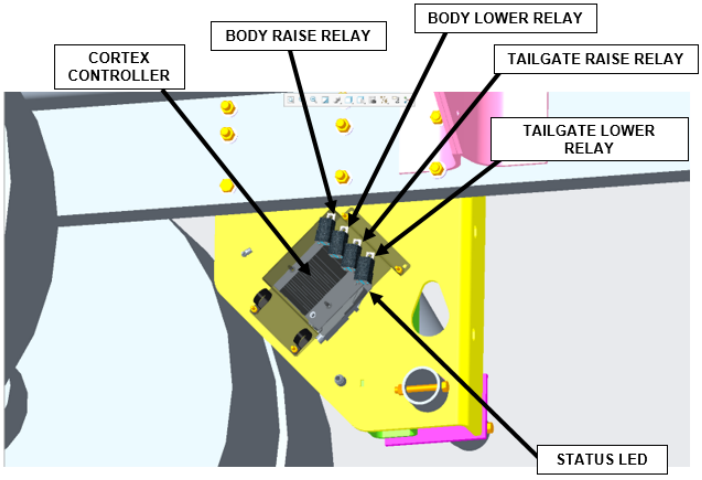


Figure 46. Under View of Body Controller

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INSIGHT™ DIAGNOSTIC DISPLAY

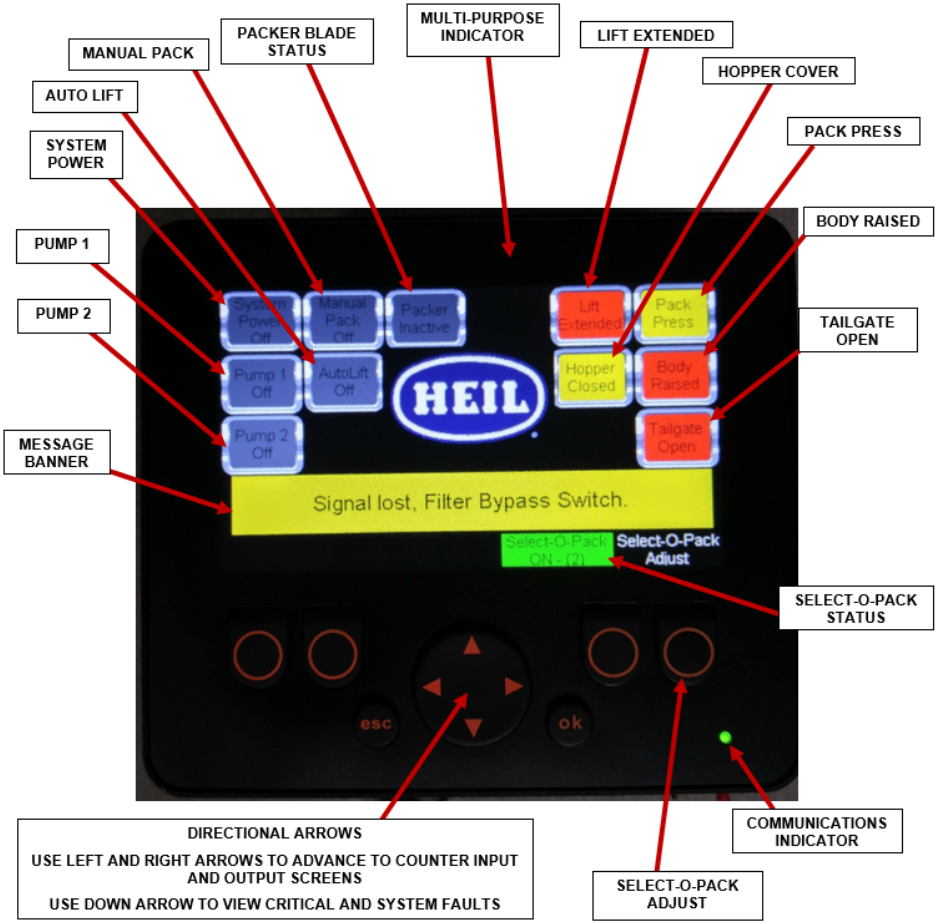


Figure 47. InSight Display

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InSight™ Diagnostic Display Indicators

A. Display Indicators

1. System Power
 a. Indicates the status of the System Power Switch, On (Green)/Off (Gray)
 b. Indicates the status of the Hotshift PTO, On (Green)/Off (Yellow), if equipped
2. Manual Pack - Indicates the status of the Manual Pack Switch, On (Green)/Off (Gray)
3. Packer Blade Status
 a. Inactive (Gray)
 b. Pack Moving Left (Green)
 c. Pack Moving Right (Blue)
4. Multi-Purpose Indicator
 a. Side Door Indicator – Indicates status of Side Door, Open (Red)/Closed (Green), if equipped
 b. Low Oil Indicator – Indicates Hydraulic Oil Level, Low (Red), if equipped
 c. Filter Bypass – Indicates Filter In Bypass, Bypassing (Red)
 d. Indicator disappears if above conditions are all Good
5. Lift Extended - Indicates Lift Position, Extended (Red) /Stowed (Green)
6. Pack Press - Indicates the status of the Packer Pressure Switch, On (Yellow)/Off (Gray)
7. Pump 1 - Indicates Status of Pump 1 Off, Enabled and ON
 a. Disabled (Gray)
 b. Enabled but Inactive (Yellow)
 c. Active (Green)
8. AutoLift - Indicates the status of the AutoLift Switch, On (Green)/Off (Gray)
9. Hopper Cover - Indicates Hopper Closed or Open, if equipped
 a. Cover Open (Green)
 b. Cover Not Open (Yellow)
 c. Indicator disappears with Hopper Cover Ind. Option OFF
10. Body Raised – Indicates Body Hoist Status, Raised (Red)/Lowered (Green)

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InSight Display Indicators (Continues)

11. Pump 2 - Indicates Status of Pump 2 Off, Enabled and ON
 a. Disabled (Gray)
 b. Enabled but Inactive (Yellow)
 c. Active (Green)
12. Tailgate Open - Indicates Tailgate Status, Open (Red)/Closed (Green)
13. Select-O-Pack Status – Displays On/Off status and setpoint value of Select-O-Pack. With Select-O-Pack enabled, each operation of the lift will trigger the packer to run the selected number of sweeps, a sweep being one stroke from left to right or right to left. When the count is full the packer will stop until the next lift operation.

Requirements to turn Select-O-Pack On.

 a. Setpoint > 0
 b. Hyd. Pump Enabled
 c. Manual Pack and Service Mode Off
 d. Body Lowered and Tailgate Closed

14. Communications Indicator – Indicate status of communications between the cortex controllers.
 a. Communications Good, (Green, 1Hz Flash)
 b. Communications Lost with Cab Controller, (Red, 2Hz Flash)
 c. Communications Lost with Body Controller Lost, (Red, Continuous)

B. Message Banner

The following is the list of potential messages that could be displayed on the Message Banner.

Critical Faults - Results in system shutdown, allowing limited or no operation. Faults reset by cycling system power switch. (Red)

1. Cab Controller Communication Timeout. Hydraulic Pump Shutdown

The Cab controller has lost communications with other devices on the network.

Operation is allowed in 15 second intervals, under the following conditions:

 a. Transmission in Neutral
 b. Service Brake Applied
 c. Joystick Red Pump Enable button pressed

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InSight Display Indicators (Continues)

1. Side Door Interlock. Close Side Door, Reset System Power.
2. Low Hydraulic Oil. Fill hydraulic tank to proper level, Reset System Power
3. Transmission Temp High with Hot shift PTO engaged, Reset System Power.
4. Allow system to cool and reset by cycling system power switch.
5. J1939 Engine Communications Lost. Pump Operation allowed in 3 min intervals, Reset System Power.
6. J1939 Chassis Communications Lost. Lift Operation in Neutral Only.
7. Filter Bypass Shutdown. Pump Operation allowed in 3 Min Intervals, Reset System Power.
8. Hydraulic Temp Shutdown. Hydraulic Oil Temp Exceeds 200 Degrees F, Reset System Power. Allow system to cool and reset by cycling system power switch.

System Faults - Signal lost or device disconnected rendering associated functions inoperable. (Yellow)

1. Supply Voltage Lost, Body Controller VBB1-p19. Check Fuse F3
2. Supply Voltage Lost, Body Controller VBB2-p1. Check Fuse F4
3. Supply Voltage Lost, Cab Controller VBB1-p19. Check Fuse F4
4. Supply Voltage Lost, Cab Controller VBB2-p1. Check Fuse F2
5. Supply Voltage Low, Body Controller VBBs-p10
6. Supply Voltage Low, Body Controller VBB1-p19
7. Supply Voltage Low, Body Controller VBB2-p1
8. Supply Voltage Low, Cab Controller VBBs-p10
9. Supply Voltage Low, Cab Controller VBB1-p19
10. Supply Voltage Low, Cab Controller VBB2-p1
11. Switch Bank Disconnected. Check Switch Bank(s)
12. Signal lost. Hyd. Oil Temp Transducer

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InSight Display Indicators (Continued)

13. Signal lost. Filter Bypass Switch
14. J1939 Trans. Communications Lost. Cannot determine current gear.
15. Signal lost. Packer Pressure Switch
16. Signal lost. Grabber Pressure Switch

Operator Alert - Functions disabled or Interlock active. (Yellow)

1. System Power Off. System disabled.
2. Hydraulic Pump Off
3. Lift Interlocked. Open Hopper Cover to Proceed
4. Lift Interlocked. Close Grabber to Proceed
5. Grabber Interlocked. Lower Lift to Proceed
6. The commanded action can only execute in Manual Pack Mode. Switch to Manual Mode.
7. Packer reversing direction on pressure switch.

Operator Warnings - hazardous operating conditions. (Yellow)

1. Lift Extended, with Vehicle in Motion. Retract Lift
2. Tailgate Open, with Vehicle in Motion. Close Tailgate
3. Body Raised, with Vehicle in Motion. Lower Body
4. Hyd. Oil Temp. Warning, Oil Temp Exceeds 180 Degrees F

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SELECT-O-PACK ADJUST

Pressing this button displays the Select-O-Pack Adjust Screen. To adjust the number of packer sweeps per lift cycle increment and decrement the setpoint by pressing the up and down directional arrows. Setpoint value is in odd number values only.



Figure 48. Select-O-Pack Adjust

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COUNTER SCREEN

Daily Arm Cycles - Counts when Lift returns to the fully stowed position. resettable

Maintenance Hours – Counts hours with Pumps Enabled. resettable

Daily Pack Cycles – Counts when Packer Panel reaches the end of its sweep. resettable

Total Arm Cycles - Counts when Lift returns to the fully stowed position. non-resettable

Filter Bypass Hours - resettable

Total Pack Cycles - Counts when Packer Panel reaches the end of its sweep. non-resettable

Total Pump Hours - Counts hours with Pumps Enabled. non-resettable



Figure 49. Counter Screen

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LIFT OPERATION

Joystick operation is interlocked by the Lift Enable Solenoid. This solenoid enable/disable lift control functions by controlling the air supply to those functions.

Lift Enable Solenoid

This solenoid enables lift operation and will activate under the following conditions.

Condition #1 (on route operation)

ON = with Pump Control Enabled AND Engine Speed < 900rpm AND Body Hoist Down AND Vehicle Road Speed < 7mph (default) AND Service Brake applied.

Condition #2 (stationary operation)

ON = with Pump Control Enabled AND Engine Speed < 900rpm AND Body Hoist Down AND Vehicle Road Speed < 7mph(default) AND Transmission in Neutral.

Condition #3 (stow lift on the fly)

ON = Pump Control Enabled AND Body Hoist Down AND Lift Stow Option ON AND (Grabber Closed OR Lift Extended) AND Grabber Open Button pressed.

Condition #4 (service mode)

ON = with Pump Control Enabled AND Engine Speed < 900rpm AND Service Mode ON AND Vehicle Road Speed < 7mph (default) AND Transmission in Neutral.

PACKER OPERATION

For more information, see **Features** 53.

- The packer will complete one cycle (180 degree of rotation) in 13-15 seconds at 700rpm.
- The packer will not pause during lift operation.
- The packer will not function above 1800rpm.
- When the “Manual Pack” switch is ON, the packer will only operate with the “Pack Left” or “Pack Right” switch pressed. Packer travel direction will be determined by which switch is pressed.
- When Select-O-Pack is enabled, each operation of the lift will trigger the packer to run the selected number of cycles (one 180 degree of rotation). When the count is full the packer will stop until the next lift operation.
- When Select-O-Pack is disabled, the packer will remain stationary.

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NOTES:

SECTION 5
BODY AND TAILGATE PROPS

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PREVIEW

Read this section to learn about:

- Using the body props
- Using the tailgate props

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PROPPING THE BODY

Operators **MUST KNOW** how to **SAFELY** prop up the unit's body. You may need to prop the body up when you clean the inside of the body or for maintenance or repair procedures.
Use the factory-supplied body props to prop the body as described below.

Observe and obey the following DANGER and WARNING notices while you prop the body with the factory body props.

Factory Body Props

Follow These Steps:

A. To lower the body props:

⚠ DANGER

Any part of your body between the unit's body and the chassis or cylinders while you raise the body is dangerous. Serious injury or death will occur if the unit's body suddenly lowers and traps a part of your body. Keep all parts of your body out from underneath the unit's body during this procedure.

NOTICE

Empty body of all refuse before using body props.

⚠ DANGER

The unit may roll when you raise the body on unstable or uneven ground and cause serious injury or death to you or bystanders. Do not prop the body while the unit is on unstable or uneven ground. Clear the area of all people not necessary for this procedure and set the unit on stable and even ground before you start this procedure. Make sure all tire pressures are correct.

⚠ WARNING

Interconnected body props are installed on the unit. Both props MUST be used.

NOTICE

Units manufactured after April 2009 have the manual override valve. If you have not experienced problems with the service hoist, you may not need the override valve. If you have experienced problems with the service hoist, contact your Heil dealer or Heil.

1. Make sure the packer is in the MANUAL mode.
2. Raise the tailgate and prop it. See **Factory Tailgate Props** 75.
3. Use the BODY UP/DOWN switch and raise the body sufficiently to operate the body props.

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Factory Body Props (Continued)

4. RELEASE the body props and let the body props down.
5. Use the BODY UP/DOWN switch and LOWER the body so that the props rest in the body prop support.
6. The BODY T/G light is ON.
7. Put the unit in the lock-out mode and remove the ignition keys. Refer to the **Lock-Out/Tag-Out Procedure** 47.
8. When you complete the service or maintenance action, take the unit out of the lock-out mode, insert the ignition key and start the engine.

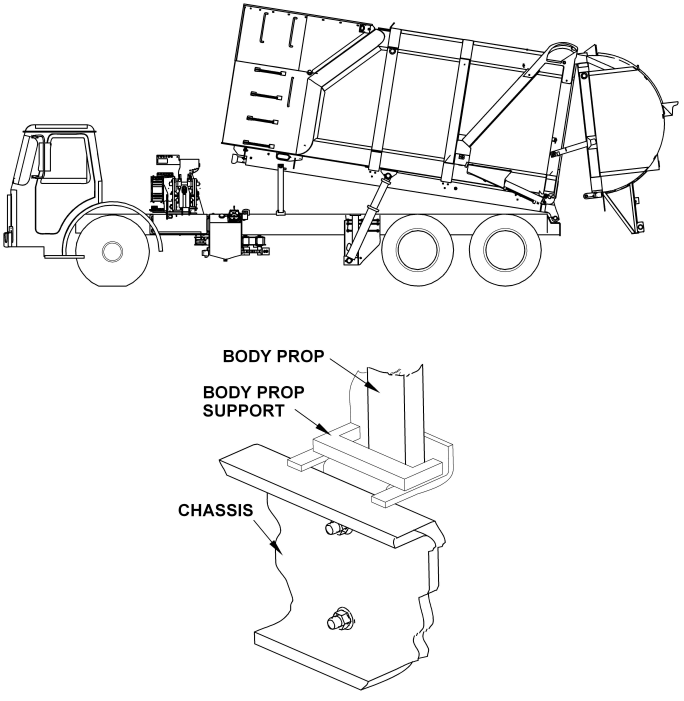


Figure 50. Factory Body Props

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Factory Body Props (Continued)

B. To store the body props:

⚠ DANGER

Any part of your body between the unit's body and the chassis or cylinders while you raise the body is dangerous. Serious injury or death will occur if the unit's body suddenly lowers and traps a part of your body. Keep all parts of your body out from underneath the unit's body during this procedure.

1. Use the BODY UP/DOWN switch and RAISE the body sufficiently to REMOVE the load from the body props.
2. Lift each body prop and RETURN the props to the transit position and secure each body prop.
3. LOWER the body until it completely rests on the chassis.
4. Use the T/G UP/DOWN switch and LOWER the tailgate sufficiently to REMOVE the props from their pockets.
5. STORE the tailgate props and lower the tailgate.
6. The BODY T/G light is OFF.

PROPPING THE TAILGATE

YOU MUST prop the tailgate when you open it for service or maintenance. Use the instructions that follow and prop the tailgate with either the factory-installed tailgate props or a tailgate prop built specifically for your unit.

Observe and obey the following DANGER and WARNING notices while you prop the body with either the factory body props or with alternate props.

⚠ DANGER

A tailgate in motion is dangerous. Serious injury or death may occur if a person is struck by a moving tailgate or becomes trapped between the tailgate and the body. Clear the area near the tailgate of all unnecessary people before you lower the tailgate.

Factory Tailgate Props

YOU MUST USE BOTH of the two support props at the rear of each unit whenever you open the tailgate for service or maintenance.

1. MAKE SURE the unit is on flat, stable ground and apply the parking brake and chock the wheels.

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Factory Tailgate Props (Continued)

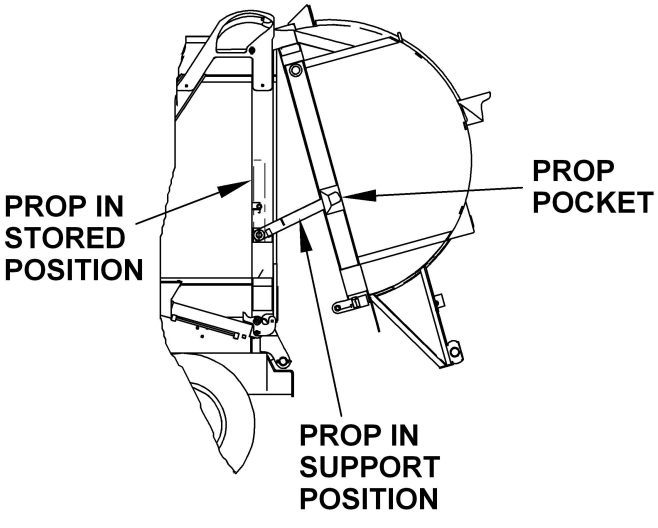


Figure 51. Tailgate Props

⚠ DANGER

Always prop the tailgate when you leave it raised for maintenance, service or cleaning procedures. Any part of your body between the unit's body and the tailgate while you prop the tailgate or when the tailgate is propped is dangerous. Serious injury or death may occur if any part of your body is between the tailgate and the body if the tailgate suddenly closes.

2. Make sure the packer is in the MANUAL mode.
3. Use the TAILGATE UP/DOWN switch and raise the tailgate enough to RELEASE and rotate the props so that you can put each prop in its prop pocket on each side of the tailgate. LOWER the tailgate enough to secure the props in the pockets.
4. The BODY TAILGATE light is ON.
5. Put the unit in the lock-out mode and remove the ignition keys. Refer to the **Lock-Out/Tag-Out Procedure** 47.
6. When you complete the service or maintenance action, take the unit out of the lock-out mode, insert the ignition key and start the engine.
7. Use the TAILGATE UP/DOWN switch and RAISE the tailgate sufficiently to remove the props from their pockets.
8. Store the tailgate props.
9. LOWER the tailgate until it is completely CLOSED.

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SECTION 6
DAILY CHECKLIST

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DAILY CHECKLIST

Make sure you perform a daily check of the unit. Make copies of the **Refuse Vehicle Daily Inspection** 80 on the next several pages to have the Operator mark completed items before each route. Many checks in the Daily Checklist are maintenance related, such as checking tire pressures and hoses for wear and damage.

Refer to the **Daily Checklist Maintenance Items Chart** below for items to check and the required action.

DAILY CHECKLIST MAINTENANCE ITEMS	
Item	**Required Action**
Low air pressure in tires	Inflate the tire to the correct air pressure given on the tire
Worn tire	Replace when the wear is greater than allowed by law or before the tread is no longer visible
Damaged tire	Replace immediately BEFORE going on route.
Hydraulic pump leaks	Determine the cause of the leak and repair immediately.
Damaged hydraulic pump	Repair or replace IMMEDIATELY
Loose or missing hardware for the hydraulic pump	Tighten loose hardware Replace missing hardware immediately
Damaged decal or decal not readable	Replace decal immediately
Low level of hydraulic oil	Fill the hydraulic oil tank immediately
Worn or damaged hoses	Replace immediately
Leaks at cylinders, hoses or fittings.	Tighten loose connection
Loose or missing hardware	Tighten loose connections Replace missing hardware
Worn fiber guards	Replace hoses/fittings as necessary Install new fiber guard on new hoses
Worn or damaged tailgate lock components	Replace worn or damaged components
Loose or missing tailgate lock hardware	Tighten loose hardware Replace missing hardware
Damaged tailgate seal	Replace seal

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DAILY CHECKLIST MAINTENANCE ITEMS	
Item	**Required Action**
Body structure has loose or missing hardware	Tighten loose hardware Replace missing hardware
Body structure has cracked weld joints	Repair immediately
Body mounting brackets have loose hardware, damaged hardware or cracked welds	Tighten loose hardware Replace missing hardware Repair cracked welds
Air regulator (typically located at front of body)	90 PSI

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REFUSE VEHICLE DAILY INSPECTION

DATE: _____/_____/_____

UNIT NO. _____

Enter one of the following codes in the Inspection Results Code column:

Use a √ to indicate inspected and no repair, service or adjustment is necessary.
Use an **R** to indicate repair, service or adjustment is necessary.
Use an **N** to indicate vehicle not equipped.

FOLLOW ALL APPLICABLE LOCK-OUT / TAG-OUT PROCEDURES

Printed Name of Operator:

I certify with the signature that follows that I performed a complete inspection in accordance with the following check list on the date given above.

Refer to **Preventative Maintenance Chart** and **Lubrication Guide** for additional information and requirements.

Signature of Operator:

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CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
INSPECT PER APPLICABLE MANUFACTURER MANUAL	
Cab/Drive	
Wheels and Tires	
Tractor and Chassis Electrical	
Chassis	
Engine & Transmission & Fluid Levels	
Tractor, 5th Wheel and Chassis Lubrication	
REFUSE COLLECTION SYSTEMS AND COMPONENTS	
CAB OUTSIDE AREA	
Check air pressure of tires. Add air to any tire with air pressure lower than recommended before going on route.	
Check wear of tire tread. Replace tire worn below tire manufacturer's recommendation or state requirement before going on route	
Check tires for damage. Replace any damaged tire before going on route	
Inspect pump for leaks	
Inspect pump for damage or loose hardware	
Decals on bumper for damage and readability	
Inspect unit for refuse on or about the engine or exhaust components. **Remove all refuse to prevent a fire**	
BODY AND CHASSIS CURB SIDE INSPECTION	
Inspect level of hydraulic oil if tank is mounted on curb side. It must be full. **Add recommended oil as necessary**	

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CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
Inspect loader hydraulics for	
Cylinder, hoses and fittings for leaks	
Hoses for wear and damage	
Cylinders for damage	
Loose or missing mounting hardware	
Wet fiber guards – replace hoses/fittings as necessary – MAKE SURE TO INSTALL FIBER GUARD ON NEW HOSE TO PREVENT HYDRAULIC LEAKS REACHING ENGINE SURFACES WHICH CAN CREATE A FIRE HAZARD	
Inspect decals on body prop for damage and readability	
Inspect body structure for damage, loose or missing nuts and bolts and for cracked welds and metal	
Inspect body mounting brackets for cracked welds, missing bolts or nuts or movement	
Inspect decals on curb side body for damage and readability	
Check air pressure of tires. Add air to any tire with air pressure lower than recommended before going on route	
Check wear of tire treads. Replace any tire worn below tire manufacturer's recommendation or state requirement before going on route	
Check tires for damage. Replace any damaged tire before going on route	
Inspect tailgate raise components	
Cylinder, hoses and fittings for leaks	
Hoses for wear and damage	
Cylinder for damage	
Loose or missing mounting hardware	
Inspect tailgate lock components	

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CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
Latch components for wear or damage	
Loose or missing mounting hardware	
Tailgate is locked	
TAILGATE	
Inspect decals on tailgate and underride bumper for damage and readability	
Inspect tailgate seal for visible damage	
Inspect underride bumper for damage and loose components	
BODY AND CHASSIS STREET SIDE INSPECTION	
Tailgate is locked	
Inspect tailgate lock components	
Latch components for wear and damage	
Loose or missing mounting hardware	
Inspect tailgate raise components	
Cylinder, hoses and fittings for leaks	
Hoses for wear and damage	
Cylinder for damage	
Loose or missing mounting hardware	
Check air pressure of tires. Add air to any tire with air pressure lower than recommended before going on route	
Check wear of tire treads. Replace any tire worn below tire manufacturer's recommendation or state requirements before going on route	
Check tires for damage. Replace any damaged tire before going on route	

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CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
Inspect all decals on curb side body for damage and readability	
Inspect body structure for damage, loose or missing nuts and bolts and for cracked welds	
Inspect body mounting brackets for cracked weld, missing bolts or nuts or movement	
Inspect decals on body prop for damage and readability	
Inspect level of hydraulic oil if tank is mounted on streetside. It must be full. **Add recommended oil as necessary**	
If equipped, the hopper cover is DOWN	
Battery disconnect switch is turned to OFF then:	
Check wiring and battery cables from the battery box to the engine starter for wear and other damage. **IMMEDIATELY REPLACE WORN OR DAMAGED WIRING**	
Check wiring and cables for loose connections. **IMMEDIATELY TIGHTEN LOOSE CONNECTIONS**	
OPERATION OF UNIT - *Skip this section if the unit will not be operated today*	
Close the air tank drain valve	
Turn battery disconnect to ON	
Apply parking brake	
Make sure the starter interlock operates – make sure unit will not start in gear	
Start the engine. Indicator lights and gauges show normal operation of engine	
Make sure the parking brake does not allow the vehicle to move forward or reverse at idle	
Make sure the throttle advance (if equipped) operates only in neutral	
Make sure all cab, body and tailgate lights operate	
Make sure the backup alarm and light operate	

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CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
Make sure all people not necessary and any hazards are clear of the area and then:	
If equipped, engage the PTO	
Pull the System Power knob UP – the switch's red light is ON and the PUMP ON light is ON	
Push the System Power knob DOWN – the switch's red light is OFF and the PUMP ON light is OFF	
Pull the System Power knob UP – the switch's red light is ON and the PUMP ON light is ON	
The FILTER CHANGE light is OFF. If not, and the filter was not changed before starting the unit, report this to your supervisor immediately. DO NOT go on route until the unit is repaired if the filter was not changed	
Operate the packer in the auto mode – the packer continuously sweeps left and right	
Operate the packer in the manual mode – manually move the packer to the left. The PACKER LEFT light is ON	
Operate the packer in the manual mode – manually move the packer to the right. The PACKER RIGHT light is ON	
The PACKER PSW light is OFF. If not, report this to your supervisor immediately. Do not go on route until the unit is repaired	
The TRANS TEMP light is OFF. If not, report this to your supervisor immediately. Do not go on route until the unit is repaired	
Operate all functions of the lift with the standard joystick controls:	
EXTEND, RETRACT, RAISE, DUMP and LOWER	
GRABBER CLOSE, GRABBER OPEN	
Do a Coordinated Lift cycle	
If equipped, operate all eight single functions of the lift with the auxiliary lift controls:	
EXTEND, RETRACT, RAISE, DUMP and LOWER	

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CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
GRABBER CLOSE, GRABBER OPEN	
If equipped, operate the standard Auto Neutral controls	
If equipped, operate the remote Auto Neutral controls	
Turn Auto Neutral OFF	
If equipped, enable the Feather Valve controls and operate all lift arm functions. The lift arm should be slower	
OPERATION OF UNIT - Continued	
If the body has refuse:	
Raise the body slightly – the BODY T/G UP light and alarm are ON	
Lower the body completely until it rests on the chassis	
The BODY T/G UP light and alarm are OFF	
If the body does not have refuse, use the in-cab controls and:	
Raise the body	
The BODY T/G UP light and alarm are ON	
Make sure the body props rotate fully down, then store the boy props	
Lower the body completely	
The BODY T/G UP light and alarm are OFF	
Open the tailgate	
The BODY T/G UP light and alarm are ON	
Set the tailgate props	
Inspect the tailgate seal for damage	

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CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)
Store the tailgate props and raise the tailgate completely	
Close the tailgate	
The BODY T/G UP light and alarm are OFF	
Make sure the tailgate flag is DOWN.	
Move the lift arm to the TRANSIT position – lift arm is towed and the grabber is fully OPEN and against the unit	
Keep the engine running and continue the inspection	
IN-CAB INSPECTION	
Inspect all in-cab decals for damage and readability	
Do one automatic packer cycle	
Make sure the following lights are OFF:	
Body T/G UP	
TRANS TEMP	
FILTER CHANGE	
PUMP ON light is OFF – if it is ON, push the System Power knob DOWN	
If equipped, check the operation of each camera	
FINAL INSPECTION	
While you walk completely around the vehicle, look for:	
Fluid leaks	
Cracked or damaged welds and metal	
Loose or missing bolts, nuts and clamps	

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CHECKS AND INSPECTIONS	INSPECTION RESULTS CODE (√/R/N)

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SECTION 7
BEFORE GOING ON ROUTE

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PREVIEW

Read this section to learn proper procedures for:

- Checking the unit each day
- Starting the unit in cold weather
- Setting the unit up for the route
- Removing power to the unit during periods of not using the unit.

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BATTERY DISCONNECT SWITCH

The battery box is typically located on the streetside of the chassis frame near the front of the body, however it can be mounted at a different location on different chassis. Become familiar with the location of the battery box and battery disconnect switch on your unit.

1. You must turn the battery disconnect switch to the OFF position whenever the unit is shut off for any length of time – especially when the unit will be left unattended.
2. You must turn the battery disconnect switch to the ON position whenever you will use the unit.
3. You must check the position of the battery disconnect switch as part of the daily inspection.

NOTICE

Battery cables must be securely anchored and not rubbing other equipment. Cable insulation must be free of damage and abrasion. Inspect weekly.

NOTICE

Always disconnect the battery before welding on the chassis or body.

DAILY CHECKLIST

See the **Daily Check section** 77 for the daily checks and procedures checklist. Make a copy of the check list.

⚠ WARNING

A unit that needs service or repair can malfunction and create a dangerous condition. A part failure during operation can cause serious injury or death to a person or damage to the unit. Repair or replace any failed or defective part immediately.

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BEFORE STARTING A ROUTE

Before you start a route, do the following:

- ☐ Perform an inspection of the unit with the **Daily Checklist** 77.
- ☐ Check the **Hydraulic Oil Level**.
- ☐ Cycle all **Hydraulic Functions**.
- ☐ Check the **"In-transit" Settings**.

Use the Daily Checklist to Inspect the Unit

It is the operator's responsibility to do a visual inspection of the unit and make sure the unit is in good operating condition before you start a route.

The requirements for the daily checks are given in the **Daily Checklist section** 77. Make sure you complete the inspections on the checklist and you make all entries, including your signature.

COLD WEATHER WARMUP PROCEDURE

When ambient air temperature is cold (below 0 degrees F), it is necessary to warm up the unit's hydraulic oil before you start your daily route operation or to check the oil level. The hydraulic oil is sufficiently warmed when the temperature is between 120° and 160°F.

⚠ WARNING

Moving parts on the unit are dangerous. Serious injury or death can occur if a person is struck by the equipment. Clear all people from the area before you operate the unit

Follow the steps below to warm up the hydraulic oil.

1. START the TRUCK and let the engine idle.
2. APPLY the PARKING BRAKE and make sure it holds.
3. ENGAGE the HYDRAULIC PUMP for approximately five minutes.
4. MAKE SURE the AREA IS CLEAR of all unnecessary people BEFORE you operate the controls.
5. OPERATE the PACKER PADDLE functions through ten (10) cycles while the engine idles. See the Operator's Manual for operation instructions.
6. Make sure the oil temperature on the site gauge is between 120° and 160°F. If not, repeat step 5.
7. Check for fluid leaks. Repair if necessary.

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PREPARING THE UNIT TO CHECK THE HYDRAULIC OIL LEVEL

Before checking the oil level or adding oil, make sure the oil is warmed up and the unit is in the following position with all cylinders collapsed:

- Truck – on level ground
- Tailgate – fully down and locked
- Body - fully down
- Lift Arm – in the "In-Transit" position
 - Reach cylinder - retracted
 - Lift cylinder - lowered
 - Grabbers - open and against body

CHECK HYDRAULIC OIL LEVEL

Check the hydraulic oil level (after warming up the oil) daily or every eight (8) hours, whichever comes first. Fill as necessary.

CYCLE ALL HYDRAULIC FUNCTIONS

☑ Follow These Steps:

1. Operate the lift arm, grabbers, top door (if equipped), packing panel, body and tailgate functions two or three times each. See **Section 4** 51 for proper operation of controls.
2. Put the unit back in the position described above and check the oil level again.
3. Add oil if necessary. Refer to the Service Manual for instructions for filling the oil tank.

Current Heil standard hydraulic oil is **Shell Tellus S2 VX 32**. Please see product TDS and MSDS for more detail information about it. We strongly recommend to use it on Heil products to get best system performance and oil service life. Refer to the Service Manual for other approved hydraulic oils.

NOTICE

Cold weather operation requires special oil considerations. Viscosity should not exceed 7500 SSU at lowest startup temperature. Continuous operation should range between 40–1000 SSU for all temperature ranges.

NOTICE

Contamination is a hydraulic system’s worst enemy. DO NOT let dirt enter the system. Use a clean rag and remove dirt or other contamination around any system component before you disconnect or remove it. While you fill the reservoir, filter the oil through a 200 mesh (or finer) screen. NEVER use a cloth to filter the oil.

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NOTES:

SECTION 8
ON-ROUTE OPERATION PROCEDURES

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PREVIEW

Read this section to learn about:

- Setting up the unit for a route
- Loading refuse manually with the lift arm
- Packing the load
- Packing on-the-move
- Washout system
- Setting up the unit for the landfill or transfer station.

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DRIVING TO PICK-UP LOCATIONS

Before you drive the Liberty unit to and from a route, along the route, to the landfill, etc., make sure the unit is set up in the traveling or "in-transit" position:

1. The body is fully down.
2. The tailgate is down and latched.
3. The packer paddle
 a. For empty unit - idle position
 b. For full unit - up tight against refuse
4. The lift arm is in a transit position:
 a. Reach cylinder retracted
 b. Lift cylinder lowered
 c. Grabbers open and against body
5. Packer switch and PTO switch are OFF.
6. The SYSTEM POWER switch is OFF.
7. If equipped, the hopper cover Is CLOSED.
8. The mirrors are properly adjusted and clean.
9. ALL body lights operate correctly.

USE OF CURB SIDE DRIVE

If equipped, drive from the curb-side driver position ONLY on the collection route. DO NOT use this station during travel to or from a route, landfill or transfer station.

LIFTING AND LOADING REFUSE WITH THE LIFT ARM

Use the following procedures at each stop along the route to load refuse into the Liberty unit with the lift arm. Observe the DANGER and WARNING notices.

NOTICE

If local rules and laws require more clearance, you must follow them.

1. Move the unit to a position that is best to load the refuse with the lift arm. Practice this maneuver for best results.
2. ADJUST the container spot mirror for BEST overhead vision of the hopper while you raise container.
3. PULL the SYSTEM POWER switch (and engage the PTO if equipped) UP. The PUMP ON light should be ON.

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LIFTING AND LOADING REFUSE

Use the following procedures at each stop along the route to load refuse into the unit. Observe all DANGER and WARNING hazard alerts.

NOTICE

If local rules and laws require more clearance, you must follow them.

1. Move the unit to a position that is best to load the refuse with the lift arm. Practice this maneuver for best results.
2. ADJUST the container spot mirror for BEST overhead vision of the hopper while you raise container.
3. PULL the SYSTEM POWER switch UP (and engage the PTO if equipped). The PUMP ON light should be ON.

NOTICE

If the engine RPMs go above 900, both pumps will be shut off and the lift will not operate.

4. The Operator's foot is on the service brake and the engine RPMs are at or below 900.

⚠ WARNING

Moving equipment can be dangerous. Serious injury or death may occur if a person is in the wrong area or is not attentive to the operations. Clear the area of all unnecessary people before you operate the controls.

5. Make sure the loading area is clear of all unnecessary people.
6. Make sure the packer is in the **Auto Pack mode**.
7. If equipped, the hopper cover is OPEN. You can damage the unit if you try to load refuse if the hopper cover is CLOSED.

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LIFTING AND LOADING REFUSE (CONTINUED)

Auto-Lift Mode

⚠ DANGER

Contact of the unit with overhead electric lines is dangerous. Serious injury or death may occur. Make sure there is adequate overhead clearance before you raise the container. Refer to **Tables 1 and 2. Overhead Clearances** 24. If the unit does make contact with overhead electric lines do not touch any metal in the cab. Stay in the unit until help arrives.

NOTICE

If local rules and laws require more clearance, you must follow them.

All units are equipped with the Auto-Lift feature. This feature allows the operator to partially automate the lifting, dumping and returning the refuse container to the ground.

Auto-Lift

1. Toggle ON/OFF by holding grabber open and close buttons simultaneously for five (5) seconds (until the in cab alarm stops sounding).
2. Closing grabbers will initiate Auto-Lift sequence. Operator must hold grabber closed button to continue cycle.
3. Container will raise and retract automatically to the dump position.
4. Operator manually replaces cart to desired position on the ground.
5. Pressing and holding grabber release (open) button will return lift to stowed position.
6. Go to the next stop on the route.

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LIFTING AND LOADING REFUSE (CONTINUED)

Manual Lift Mode

⚠ DANGER

Contact of the unit with overhead electric lines is dangerous. Serious injury or death may occur. Make sure there is adequate overhead clearance before you raise the container. Refer to **Tables 1 and 2. Overhead Clearances** 24. If the unit does make contact with overhead electric lines do not touch any metal in the cab. Stay in the unit until help arrives.

NOTICE

If local rules and laws require more clearance, you must follow them.

1. Command Extend with the joystick to make the lift extend towards the container. During reach the lift will retain its stowed height in close to the truck however reaching out farther from the unit requires the operator to control the lift height simultaneously while reaching.

NOTICE

Make sure the container is in the center of the grabbers. DO NOT use the tips of the grabbers to squeeze and lift the container.

2. Command Grab when the container is in the position. Grabbing the container lower in the strike zone will position the container farther into the hopper during full dump.
3. Command Dump by moving the joystick into the dump (7:30) position. The dump position is "sweet spot" that splits the in and up functions to get a perfect dump motion. Finding the dump position with the joystick usually requires practice to obtain a consistent and smooth dump motion. Amateur operators should error to the in position of the joystick rather than up while dumping. Erring to the up position will cause premature dumping and result in trash spilled on the ground.
4. Container Placement - Command down by moving the joystick forward. When the container is at the appropriate level, release and stow the grabbers. Note: If it is necessary to return the container to it's original position, beginner operators should completely lower the container first and then reach out as required. Only experienced operators should attempt to reach out while lowering the lift simultaneously.
5. Go to the next stop on the route.

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LIFTING AND LOADING REFUSE (CONTINUED)

Operator Proficiency

While learning to operate the lift arm, the operator should not concentrate on speed (except dumping) but should focus on making precision movements with the lift. Exception to slow operation should be taken during the dump function. The operator must be aggressive while commanding the dump function to obtain a smooth dump motion without spilling trash on the ground. Once precision movements are mastered, lift speed will naturally occur. The joystick should be considered as an extension of the operator's body, as the precision movements are mastered and veteran operational status and experience is obtained.

NOTES:

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COMPACTING THE LOAD

Loads can be compacted automatically or manually. In addition to the auto-pack mode during loading, you can pack the refuse manually any time after loading the refuse in the hopper. You can use the in-cab controls for the packer panel to compact the load again with a manual cycle.

Many factors affect how often you need to compact the load, including the operator's experience.

Select-O-Pack™

Select-O-Pack is a standard feature on all Cortex Controller™ controlled Heil Automated Side Loaders. This feature automatically cycles the Auto-Pack after a predetermined number of lift cycles.

Refer to **Select-O-Pack** in **Features** 53 for instructions on setting the Select-O-Pack feature.

Packing Near Full Load

When the body is near a full load, the packing cylinder will not extend fully before returning to the front of the hopper.

Packing On-The-Move

Heil Liberty™ units can pack on-the-move. This means you can operate the packing mechanism while the vehicle is moving, as well as when it is stationary. The default mode of the body pump is the AUTO PACK mode. This allows for continuous packing while the SYSTEM POWER switch is set to ON (and if equipped, the PTO is engaged), the pump is ON and the unit's engine is running.

You can pack-on-the-move when the Cortex Controller determines that all conditions are OK. The Cortex Controller shuts down the pump system when the engine RPMs are above safe operating speeds or the Cortex Controller determines that conditions are not correct for pump operation. The packing cycle will not begin if the RPMs are above a safe operating speed.

Refer to **Auto/Manual Pack Mode** in **Features** 53 for operation of the Auto Pack feature.

Achieving Payloads

Read this section for advice and tips on how to pack the most efficient loads with your unit.

Payloads in any refuse/waste handling vehicle will vary greatly, depending on the type of material loaded. Dry bulk cardboard and reconstruction/building materials, Styrofoam, foam packing materials, loose plastic, etc. cannot be compressed and packed as effectively as wet, soft, garbage type materials. If dry materials can be mixed with some wet material, more effective payloads can be achieved.

Follow these techniques to attain greater efficiency in packing the load in your unit:

1. After you empty the first few bins, the body begins to fill and material can begin to "fall back" into the hopper
2. If the route allows, mix some wet bins in with dry bins. This helps compact the dry material more. Wet material also helps lubricate the body, which results in better packing.

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PACKING ON-THE-MOVE

Heil Liberty units can pack on-the-move. This means you can operate the packing mechanism while the vehicle is moving, as well as when it is stationary. The default mode of the body pump is the AUTO PACK mode. This allows for continuous packing while the SYSTEM POWER switch is set to ON (and if equipped, the PTO is engaged), the pump is ON and the unit's engine is running.

You can pack-on-the-move when the PLC determines that all conditions are OK. The PLC shuts down the pump system when the engine RPMs are above safe operating speeds or the PLC determines that conditions are not correct for pump operation. The packing cycle will not begin if the RPMs are above a safe operating speed.

Refer to **Auto/Manual Pack Mode Feature** 53 for more information on the Auto Pack feature.

ACHIEVING PAYLOADS

Read this section for advice and tips on how to pack the most efficient loads with your Heil Liberty unit.

Payloads in any refuse/waste handling vehicle will vary greatly, depending on the type of material loaded. Dry bulk cardboard and reconstruction/building materials, Styrofoam, foam packing materials, loose plastic, etc. cannot be compressed and packed as effectively as wet, soft, garbage type materials. If dry materials can be mixed with some wet material, more effective payloads can be achieved.

Follow these techniques to attain greater efficiency in packing the load in your Liberty unit:

1. After you empty the first few bins, the body begins to fill and material can begin to "fall back" into the hopper as the packer sweeps in the other direction. This is normal. In the AUTO PACK mode, the packer paddle will complete a sweep in one direction then reverse direction for the next sweep. The AUTO PACK mode provides continuous packing of the refuse.
2. If the route allows, mix some wet bins in with dry bins. This helps compact the dry material more. Wet material also helps lubricate the body, which results in better packing. Of course some routes will not let you selectively pick up bins. (It is not wise to drive long distances just to mix wet material with dry material.)

LEAVING THE ROUTE FOR THE LANDFILL/ TRANSFER STATION

At the end of the route, or when the unit has a full load, prepare the unit to go to the landfill. See **Driving to Pick-up Locations** 97 and make sure the unit is properly set up for travel.

A. The body and tailgate are fully LOWERED. Check the BODY T/G UP light in the cab. It must be OFF.

B. The Packer Panel is tight against the refuse.

C. The SYSTEM POWER switch is OFF.

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LEAVING THE ROUTE FOR THE LANDFILL/ TRANSFER STATION (CONTINUED)

D. Put the lift arm and grabber in the TRANSIT (or STOWED) position.
 - The lift arm is fully DOWN and IN.
 - The grabber is fully OPEN and against the unit's body.

An alternate position is the lift arm is IN and UP with the grabber assembly in the hopper.

E. The PTO is disengaged (if equipped).
F. The SYSTEM POWER switch is DOWN or OFF.
G. If equipped, the hopper cover is DOWN.
H. The mirrors are properly adjusted and clean.
I. ALL body lights operate correctly.

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SECTION 9
LANDFILL/TRANSFER STATION/ RECYCLE CENTER PROCEDURES

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PREVIEW

Read this section to learn about:

- Setup conditions to dump the refuse
- Unloading the refuse
- Using the sump and (optional) washout system
- Preparing the unit to return to route.

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OVERVIEW OF LANDFILL/TRANSFER STATION PROCEDURES

Use the following information as an overview of the steps to follow when you dump a load of refuse at the landfill. For each step in this overview, read and follow the detailed instructions that follow the overview:

1. Set the Liberty unit in position for dumping.

NOTICE

The location of the controls on your unit may be different than those shown in this manual. Make sure you know your unit's control pattern before you operate the Liberty.

2. Fully RAISE the tailgate.
3. Keep the packer panel against the refuse and fully RAISE the body.
4. After the refuse empties from the body, LOWER the body.
5. Fully LOWER the tailgate.
6. Prepare the unit to return to the route.

SETTING UP THE UNIT FOR DUMPING

⚠ DANGER

Make sure the unit is on firm, stable ground before you raise the body and clear the area of all unnecessary people. Do not prop a body unless it is on firm, stable ground. A unit not on firm, stable ground may roll when raising or propping the body. This may cause serious injury or death to you or bystanders.

After you position the unit on firm ground for dumping at the landfill, set it up properly before dumping the refuse.

Follow These Steps:

1. Some suspensions allow more movement in the chassis than others. Always stop the unit on the most stable, hard, dry and level surface you can find before you raise the body.
2. Shift the transmission to NEUTRAL.
3. If equipped, engage the PTO and PULL the SYSTEM POWER switch UP. If there is no PTO, just PULL the SYSTEM POWER switch UP.

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UNLOCKING AND RAISING THE TAILGATE

Unlocking the Tailgate

The unit does not have a control switch to unlock (or unlatch) the tailgate. The tailgate unlocks as it starts to open. There is a flag on the curb side tailgate latch to indicate that the tailgate has cleared the locking mechanism while you raise the tailgate. The flag will be DOWN when the tailgate clears the locking mechanism.

When the tailgate is completely closed, the flag on the tailgate latch will be UP. See Figure 51.

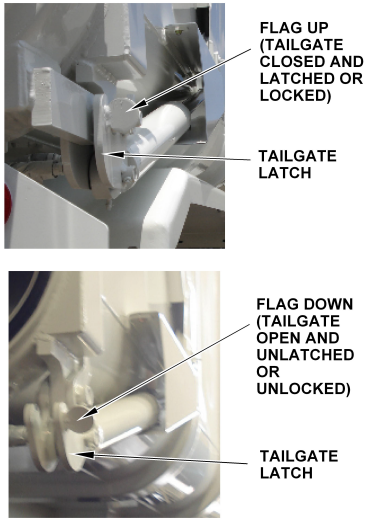


Figure 52. Tailgate Locked/Unlocked Flag

RAISING THE TAILGATE

1. Put the packer in the MANUAL mode - PRESS the AUTO PACK button to MANUAL.

⚠ DANGER

A tailgate in motion is dangerous. Serious injury or death may occur if a person is struck by a moving tailgate or becomes trapped between the tailgate and the body. Clear the area near the tailgate of all unnecessary people before you lower the tailgate.

2. PRESS the TAILGATE UP/DOWN switch to UP and HOLD the switch until the tailgate is COMPLETELY raised, which is about 30 º above the body. See Figure 52.
3. RELEASE the switch.

NOTICE

The BODY TAILGATE UP light turns ON and the in-cab alarm will sound to indicate the tailgate is open.

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RAISING THE TAILGATE (CONTINUED)

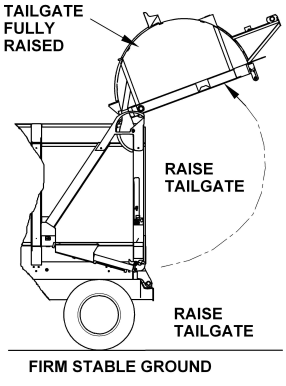


Figure 53. Raising Tailgate

UNLOADING REFUSE

Raising the Body

1. A unit with a tag axle may be unstable during dumping. ALWAYS lower the tag axle BEFORE you raise the body.

⚠ DANGER

Make sure the unit is on firm, stable ground before you raise the body and clear the area of all unnecessary people. Do not prop a body unless it is on firm, stable ground. A unit not on firm, stable ground may roll when raising or propping the body. This may cause serious injury or death to you or bystanders.

⚠ DANGER

Any part of your body between the unit's body and the chassis or cylinders while you raise the body is dangerous. Serious injury or death will occur if the unit's body suddenly lowers and traps a part of your body. Keep all parts of your body out from underneath the unit's body and away from the cylinders during this procedure.

⚠ WARNING

Raising the body with the tailgate closed can damage the underride bumper. The underride bumper can hit the ground when the tailgate is not fully raised before you raise the body. Serious injury or death may occur and also cause damage to the unit.

2. PRESS the TAILGATE UP/DOWN switch to UP and fully raise the tailgate, the RELEASE the switch.
3. PRESS the BODY UP/DOWN switch to UP and HOLD the switch until the body is COMPLETELY raised.

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RAISING THE BODY (CONTINUED)

4. When the body is completely raised, RELEASE the BODY UP/DOWN switch. See the figure below.
5. Use the PACKER LEFT/RIGHT switches and rotate the packer left and right as necessary to clear the hopper of refuse.

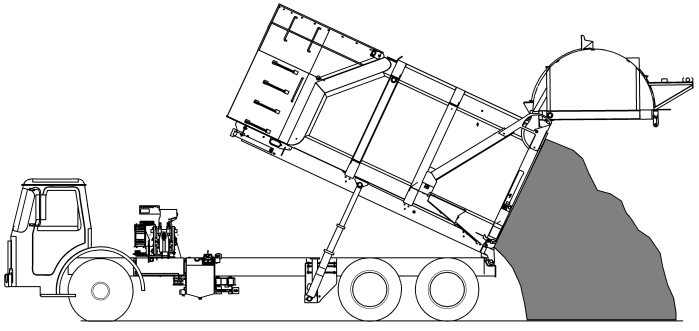


Figure 54. Raising the Body

⚠ WARNING

Do not move the unit forward or backwards excessively fast (lurch) to dump the refuse load. Excessively fast movements with the body raised may make the body unstable and tip or roll the unit over. This may result in injury or death to the operator and damage the unit. Use only sufficient movement to loosen the load so that it will leave the body.

NOTICE

Do not move the unit forward or backwards excessively fast (lurch) to dump the refuse load. Excessively fast movements with the body raised puts a very high load on the body raise cylinders and could damage one or both cylinders and make the body unstable unable to lower. Inspect the cylinders after you dump each load and replace if necessary.

6. When the refuse stops falling out of the body, SLOWLY BUT SUDDENLY move the unit FORWARD a short distance and then STOP to allow more refuse to fall out of the body. Experience will teach you how fast to move safely forward or backward before you apply the brakes.
7. If necessary, do step 6 again but go BACKWARD and then STOP to allow more refuse to fall out of the body.
8. Do steps 6 and 7 as necessary to remove all of the refuse from the body.

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RAISING THE BODY (CONTINUED)

Raising the Body (additional information)

NOTICE

Important: If a body raise cylinder hangs up for any reason as you raise the body, RELEASE the switch IMMEDIATELY so the body stops raising.

LOWERING THE BODY

ALWAYS lower the body BEFORE you lower the tailgate. If you used body props, MAKE SURE they are in the stored position BEFORE you attempt to lower the body.

Follow These Steps:

⚠ DANGER

Any part of your body between the unit's body and the chassis or cylinders while you raise the body is dangerous. Serious injury or death will occur if the unit's body suddenly lowers and traps a part of your body. Keep all parts of your body out from underneath the unit's body and away from the cylinders during this procedure.

1. PRESS the BODY UP/DOWN switch to the DOWN position.
2. HOLD the switch UNTIL the body fully mates with the chassis. When the body is COMPLETELY lowered, RELEASE the switch.

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LOWERING THE BODY (CONTINUED)

NOTICE

Important: If a body raise cylinder hangs up for any reason as you lower the body, RELEASE the switch IMMEDIATELY so the body stops lowering.

CLEAN AND INSPECT THE HOPPER AND PACKER PANEL

Follow These Steps:

1. PRESS the PACKER RIGHT or LEFT switch and let the packer paddle sweep to the right (or left) then RELEASE the switch.
2. PUSH the SYSTEM POWER switch DOWN. The PUMP ON light should be OFF.
3. Put the unit in the lock-out mode and remove the ignition keys. Refer to **Locking Out the Liberty** 47.

⚠ CAUTION

BE CAREFUL at all times when you use the ladder rungs and grab handles. Maintain good balance with two feet and one hand, or one foot and two hands, firmly in place

4. Use the ladder rungs and grab handles on the street side and look into the hopper.
5. INSPECT the packer panel and hopper floor for excessive wear or possible damage. If there is excessive wear or other damage, report the damage to your supervisor for repair or replacement of parts as soon as possible.
6. Take the unit out of Lock-Out/Tag-Out mode, then use the ignition keys and start the unit.
7. PULL the SYSTEM POWER switch UP (and engage the PTO if equipped).
8. PRESS the PACKER AUTO/MANUAL switch to AUTO and let the packer do several automatic cycles of sweeping left and right. MAKE SURE the packer travels fully LEFT and RIGHT. If it does not, report the problem to your supervisor for maintenance action.
9. PRESS the PACKER AUTO/MANUAL switch to MANUAL.

CLEAN AND INSPECT THE TAILGATE SEAL

BEFORE you lower the tailgate, MAKE SURE the area where tailgate seal mates with the body is CLEAN AND FREE of any refuse and debris. Inspect the seal for possible excessive wear or damage and replace if necessary. Report any excessive wear or damage to your supervisor.

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LOWERING THE TAILGATE

Follow These Steps:

⚠ DANGER

A tailgate in motion is dangerous. Serious injury or death may occur if a person is struck by a moving tailgate or becomes trapped between the tailgate and the body. Clear the area near the tailgate of all unnecessary people before you lower the tailgate.

1. PRESS the TAILGATE UP/DOWN switch to the UP position and RAISE the tailgate sufficiently to rotate the props out of the prop pockets.
2. STORE the tailgate props.
3. PRESS the TAILGATE UP/DOWN switch to the DOWN position and fully LOWER the tailgate until the tailgate flag is UP, then RELEASE the switch.

NOTICE

The BODY TAILGATE UP warning light will go OFF and the alarm will stop when body is FULLY down and the tailgate is completely closed.

Lock the Tailgate

The tailgate locks when it is completely CLOSED. The tailgate flag should be UP. If the flag is not UP, OPEN and CLOSE the tailgate again. The flag must be UP and the BODY TAILGATE light must be OFF.

REMOVE REFUSE FROM THE ENGINE AND EXHAUST AREAS

NOTICE

Inspect unit for refuse on or about the engine or exhaust components. Remove all refuse to prevent a fire.

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PREPARING TO RETURN TO ROUTE

MAKE SURE before you leave the landfill or transfer station:

1. The body and tailgate are fully DOWN.
2. The BODY TAILGATE light is OFF.
3. If for some reason the unit has refuse upon leaving the landfill/transfer station, select the MANUAL packer mode and put the packer panel tight against the refuse.
4. Put the lift arm and grabber in the TRANSIT (or stowed) position.
 a. The lift arm is fully DOWN and IN.
 b. The grabber is fully OPEN and against the unit's body.
5. The PTO (if equipped) is disengaged.
6. The SYSTEM POWER switch is DOWN or OFF.
7. If equipped, the hopper cover is DOWN.
8. The mirrors are properly adjusted and clean.
9. ALL body lights operate correctly.

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SECTION 10
END OF DAY PROCEDURES

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PREVIEW

Read this section to learn about:

- Parking the Unit
- Washout System
- Final Inspection
- Report to Employer/Supervisor
- Ignition Keys

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END OF DAY PROCEDURES

Parking the Unit

1. Park the unit in the space designated by your employer/supervisor.
2. Set the parking brake.

Washout System

If the unit has a washout system and you did not use it at the landfill/transfer station, you should clean the body and hopper, unless your employer has a different policy. If your employer's policy is different from this manual, follow their policy.

Final Inspection

Perform a final inspection of the unit:

1. Clear the area of all people.
2. Start the engine if it is not running.
3. Make sure all lights and in-cab control switches operate correctly.
4. Put the transmission in reverse while you press the service brake. The backup alarm should sound in the cab. If the alarm does not sound in the cab, report this to your employer/supervisor immediately.
5. Check the unit for fluid leaks from the hoses, cylinders, valves, pump and fittings. Report any leaks to your employer/supervisor.
6. Make sure all cylinders (except tailgate lock cylinders) are in their retracted position..
7. APPLY the parking brake.
8. Put the transmission in neutral and turn the engine OFF.
9. Put the unit in the **Lock-Out/Tag-Out mode** 49.
10. Open the air tank drain valve.
11. Turn the battery disconnect switch to OFF.
12. Follow the company policy for locking the cab doors.

Reports to Employer/Supervisor

Complete any reports required by your employer/supervisor. If you found any problems during the final inspection, prepare the necessary report for the employer/supervisor.

Ignition Keys

Put the ignition keys in a secure storage area designated by your employer/supervisor.

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NOTES:

SECTION 11
PREVENTIVE MAINTENANCE CHART

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BODY PREVENTIVE MAINTENANCE CHART

Preventive maintenance must be performed to ensure the safe and reliable operation of your unit. Use the chart below as a guideline for when essential items should be checked and serviced.

	*HOURS OF OPERATION					
COMPONENT/SYSTEM	**8**	**40**	**200**	**1000**	**2000**	**CHECK/SERVICE**
Hydraulic System	☑					Check oil level – add if necessary
		☑				Check cylinders, pump, hoses, tubes, fittings, and adapters for leaks. Check hoses for cracks, crushes, and cover blisters. Repair or replace if necessary with genuine Heil parts. Any replacement hose should be the same size and pressure rating as listed on the original OEM hose.
		☑				Check Control valve seals for leaks. Repair or replace if necessary.
				☑		Replace filter after first 30 days of operation, then every 6 months or 1000 hours of operation OR when filter bypass light is ON.
				☑		Replace tank breather filter every time you replace filter element.
					☑	Drain, flush, and refill. Change filter element.
Electrical, Battery Cables	☑					Check for proper operation.
		☑				Check battery cables from battery to starter for loose cables, rubbing or damage and abrasions to cables. Replace if necessary.

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*HOURS OF OPERATION						
COMPONENT/SYSTEM	**8**	**40**	**200**	**1000**	**2000**	**CHECK/SERVICE**
Operator Controls	☑					
Front Mount Pump or Power Take-Off (PTO)		☑				Check seals for leaks and operation. Replace if necessary
		☑				Check drive line for smooth operation. Replace as necessary.
		☑				Check set screws for tightness. Tighten as necessary.
		☑				Make sure keys are in place. Replace if necessary.
			☑			For greaseable PTOs (non-wet spline), remove the pump's bolt flange about 2 inches from the PTO and apply grease to female pilot of PTO pump flange. Failure to lubricate female pilot of PTO as given may cause damage to the pump shaft. Greasing is NOT required on wet spline PTOs such as the Chelsea 890/897 series.
Grease Fittings		☑				Lubricate as shown on Body Lube Chart.
Body Undercoating					☑	Inspect body undercoating and repair as necessary.
Tailgate Seal Integrity	☑					
*** Daily = 8 hrs. Weekly = 40 hrs. Monthly = 200 hrs. 6 Months = 1000 hrs. Yearly = 2000 hrs.**						

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NOTES:

SECTION 12
LUBRICATION GUIDE

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BODY LUBRICATION GUIDE

Clean fittings before applying grease and always pump enough grease into joint to remove the old grease. Wipe off excess grease. Lubricate moveable mechanical parts without fittings every 60 days with non-detergent engine oil.

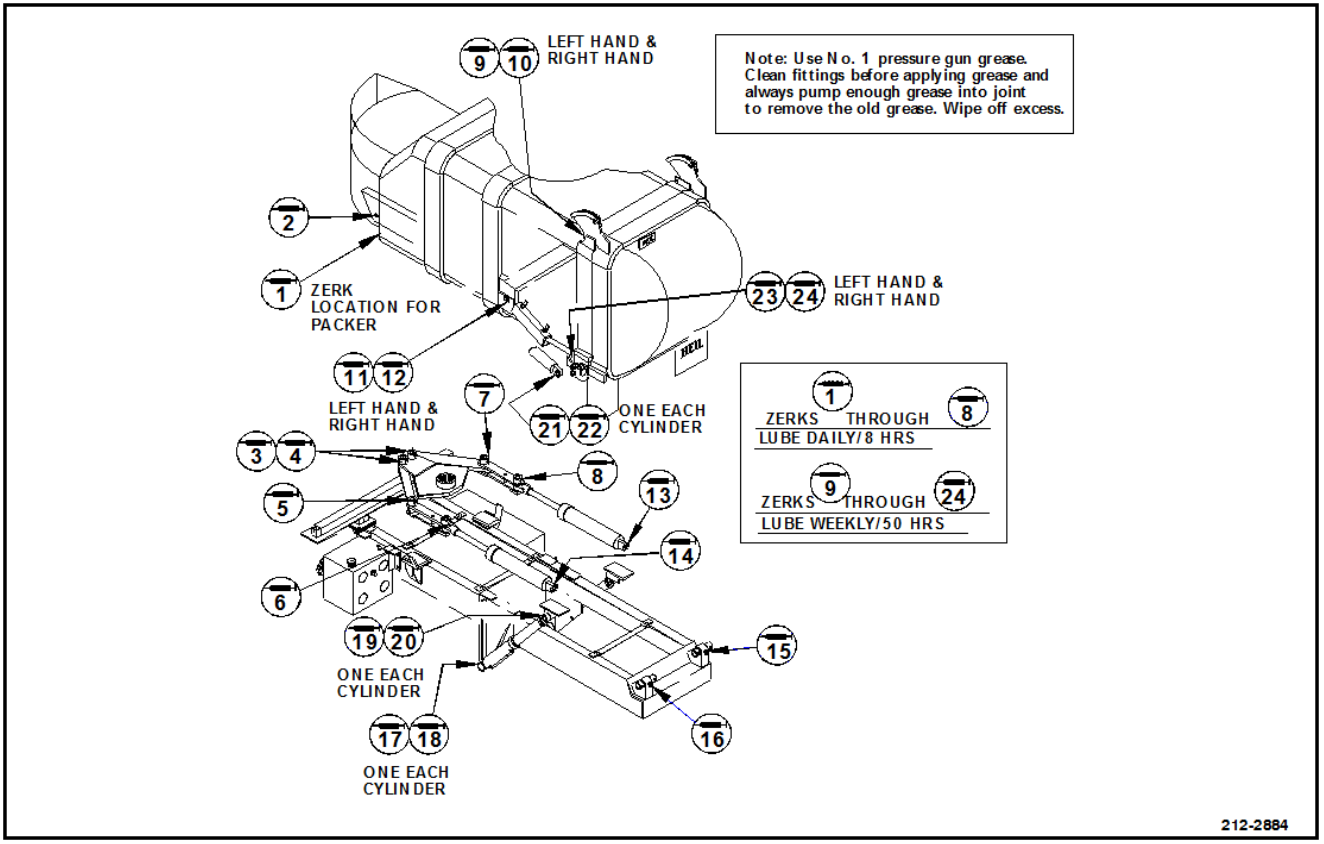


Figure 55. Body Lubrication Guide

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PYTHON LOADER LUBRICATION GUIDE

Clean fittings before applying grease and always pump enough grease into joint to remove the old grease. Wipe off excess grease. Lubricate moveable mechanical parts without fittings every 60 days with non-detergent engine oil.

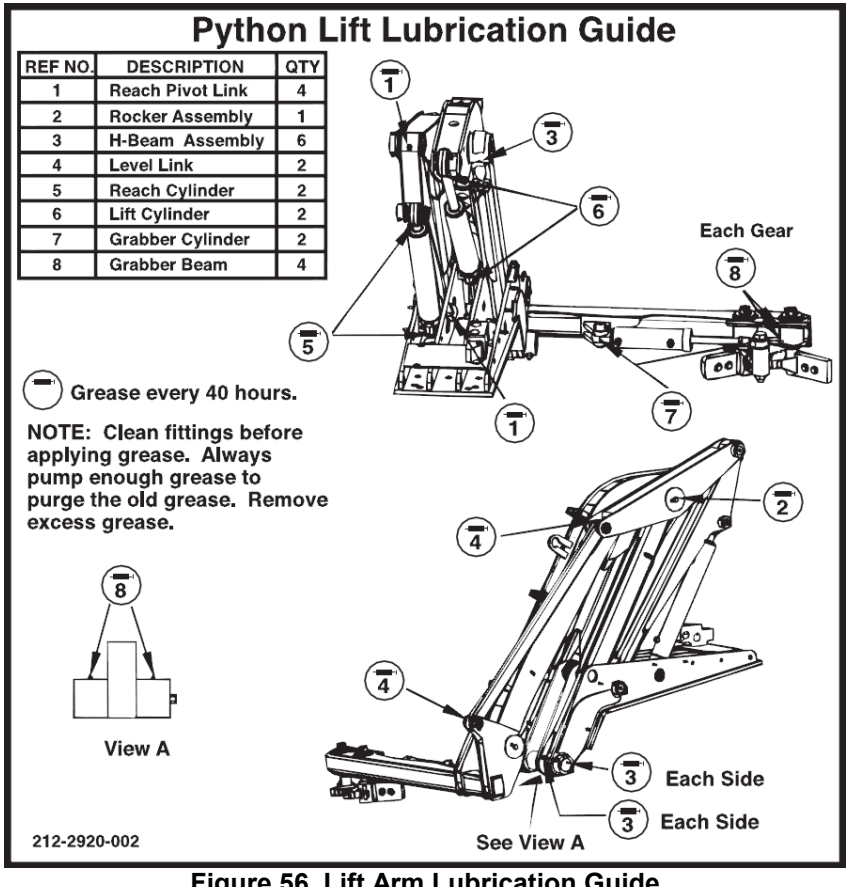


Figure 56. Lift Arm Lubrication Guide

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NOTES:

SECTION 14
COMPRESSED NATURAL GAS (CNG) OPTION

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IMPORTANT SAFETY INFORMATION

NOTICE

For CNG units, this manual should be used in conjunction with any associated CNG Fuel System and Cylinder Manufacturers' Operation, Inspection and Maintenance Manuals. Always read and understand all associated manuals alongside the Heil Operation Manual and Heil Parts and Service Manual before operating or servicing the unit. CNG training is required for any person inspecting, operating, or performing maintenance on a CNG unit. When replacing CNG components, replace with equal or higher pressure rated components.

Read, understand and follow the instructions within this document before operating, servicing or adjusting referenced equipment. Anyone using or maintaining this equipment must be familiar with the product and fully trained to operate and maintain the unit. Improper usage or maintenance of this equipment may result in injury or death.

Always keep a copy of this manual readily available for persons who operate the equipment or perform maintenance procedures. Safe working procedures must be followed at all times. **Lock-Out/Tag-Out procedures** must be followed when performing applicable procedures.

A vehicle equipped with a compressed natural gas fuel system will have a blue reflective decal on the rear of the vehicle identifying Compressed Natural Gas (CNG). See the image below.



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IMPORTANT SAFETY INFORMATION (CONTINUED)

A. Safety Notices

Throughout this manual, safety notices are included to warn operators and maintenance technicians of the dangers associated with the described equipment operations and maintenance. Improper operation or maintenance procedures may cause serious injury or death. Safety notices accompany potentially hazardous situations throughout this manual. Please read and follow instructions carefully.

For supplemental information, refer to the following codes:

- United States: NFPA 52, State and Local Regulations
- Canada: CAN/CGA B109, CAN/CSA B108, FMVSS 304

⚠ DANGER

The CNG Fuel System contains some lines that are under continuous high pressure. DO NOT attempt to loosen or disconnect those lines.

⚠ DANGER

Natural Gas is Flammable and Explosive. Never use an open flame (match, lighter, or other) to light a work area near the CNG fuel storage system.

⚠ DANGER

Keep work area well ventilated to avoid asphyxiation due to concentrated levels of carbon monoxide.

⚠ WARNING

Do not start the engine if a natural gas leak is detected.

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IMPORTANT SAFETY INFORMATION (CONTINUED)

⚠ WARNING

Never open system components while the system is under pressure. Treat all cylinders as full until defueling has been completed.

⚠ WARNING

Never weld or perform any type of "hot work" on any part of a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas.

⚠ WARNING

Avoid open flames and sparks near a compressed natural gas vehicle.

⚠ WARNING

Do not smoke cigarettes, cigars, or use any other lit or sparking items within 30 feet of a compressed natural gas vehicle or a dispensing/filling station. Do not use a cell phone or other electronic device within 30 feet of a compressed natural gas vehicle or a dispensing/filling station.

⚠ WARNING

When replacing CNG components, replace with equal or higher pressure rated components.

⚠ CAUTION

Keep the compressed natural gas equipment area well ventilated.

⚠ CAUTION

A portable fire extinguisher must be installed on the vehicle in an accessible location.

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PROPERTIES OF NATURAL GAS

CNG is a naturally occurring hydrocarbon gas mixture which consists primarily of methane. This gas is lighter than air, which means if gas were to leak, it would float upwards and quickly dissipate into the atmosphere.

CNG will burn only when in an air-to-gas mixture of approximately 5-15% so its range of flammability is limited compared to other fuels. The gas also has an ignition temperature of 1076°F which is significantly higher than diesel. As a fuel, CNG is less expensive and burns cleaner than diesel fuel, producing low emissions. These characteristics make CNG an efficient, safe choice for fueling vehicles.

It is:

- Colorless
- Odorless
- Non-corrosive
- Non-toxic

It has an:

- Auto Ignition Point: 900 - 1170° F (482 - 632°C)
- Lower Explosive Limit (%): 3.8 – 6.5
- Upper Explosive Limit (%): 13 – 17

SIGNS OF A FUEL LEAK

An odorant which smells like rotten eggs is added to compressed natural gas to aid in detection of a leak. If you notice this kind of lingering odor coming from your vehicle, you may have a leak in the CNG fuel system.

NOTE: It is normal to detect this slight odor when the fueling nozzle is being connected or disconnected during the refueling process. The odor should quickly dissipate when fueling has been completed.

If you notice any of the following, you may have a leak in the CNG fuel system:

- Frosting at suspected leak point
- Bubbling in wet area
- Blowing or hissing sound
- Flames, if a leak has ignited

If a fuel leak is suspected, the system should be shut down immediately. Refer to **Fuel System Shut Down Procedure** 136. Have the unit inspected for leaks by a qualified service technician using a methane detector or an approved liquid leak detector. Do not use any other method or products to find leaks.

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CNG FUEL SYSTEM COMPONENTS

The following pages detail a typical CNG system configuration. Your CNG fuel system configuration may vary.

A. Fuel Management Module (FMM) Functions

The CNG Fuel Management Module serves multiple functions within a natural gas vehicle (NGV) fuel system.

These functions include:

- Storage tank refueling
- Transfer fueling (defueling)
- Pressure display of high pressure side of system
- Pressure display of low pressure side of system
- Manual and ignition controlled fuel shut-off
- Pressure reduction from storage tanks to engine supply
- Fuel system filtration
- Liquid removal from fuel system

B. Fuel Management Module (FMM) Components

1. Manual Shut-Off Valve

 The FMM Manual Shut-Off Valve isolates the fuel storage system from the engine.The manual shut-off valve handle is RED and is located on the left front of the fuel control module. Rotate the handle clockwise so arrow points right to the ‘OFF’ position to prohibit fuel flow from the tanks to the vehicle’s engine.

 Rotate the handle counterclockwise so arrow points up to the ‘ON’ position to allow fuel flow from the tanks to the vehicle’s engine.

2. High Pressure Gauge

 The high pressure gauge indicates the fuel pressure in the fuel system. The gauge has a range of 0 to 5000 psi. When cylinder(s) are full and the cylinder Manual Shut-Off Valve is open, the pressure reading should read approximately 3600 psi.

3. Low Pressure Gauge

 The low pressure gauge indicates the fuel pressure sent to the engine.

 Momentum FMM (CNrG Tailgate): The gauge has a range 0 to 150 psi. Normal engine operating pressure is 70-100 psi for these Cummins CNG engines:

 - 8.9 L ISL G (2007+)
 - 11.9 L ISX12 G (2013-2018)
 - 8.9 L L9N (2018+)
 - 11.9 L ISX 12N (2019+)

 Agility FMM (Top of Body and Back of Cab): The gauge has a range 0 to 150 psi. Normal engine operating pressure is 60-100 psi for Cummins Westport ISX 12N engines and 70-140 psi for all other engines.

4. Fill Receptacles

 Fill receptacles are used to fill the CNG storage cylinders with fuel. There are two sizes: standard NGV1 (slow) or HD bus transit (fast) fill. The receptacles are equipped with built-in check valves to prevent fuel from escaping when the fuel fill nozzle is connected and disconnected.

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CNG FUEL SYSTEM COMPONENTS (CONTINUED)

B. Fuel Management Module Components (Continued)

5. Fast Fill/HD Bus Fuel Receptacle

 The fast fill/HD bus fuel receptacle is the filling port for fueling the vehicle at public fueling stations.

6. Slow Fill/NGV1 Fuel Receptacle

 The slow fill/NGV1 fuel receptacle is the filling port for fueling the vehicle at slow fueling facility, usually overnight.

7. Defuel Port

 The defueling port allows the transfer of CNG fuel into the fill receptacle of a second CNG vehicle, using a defueling hose, capturing of CNG fuel in a system that can send it back to a CNG fueling station storage facility for reuse, or atmospheric venting (if legal in your area).

8. Defuel Valve

 The defuel valve controls fuel flow when removing fuel from the cylinder during defueling operations. It is a 3-way type valve marked OFF-DEFUEL-VENT. The valve must be in the OFF position when operating the vehicle.

9. Door Sensor

 The door sensor that is located on the FMM functions as a safety interlock to prevent the vehicle from starting if the FMM access door is open.

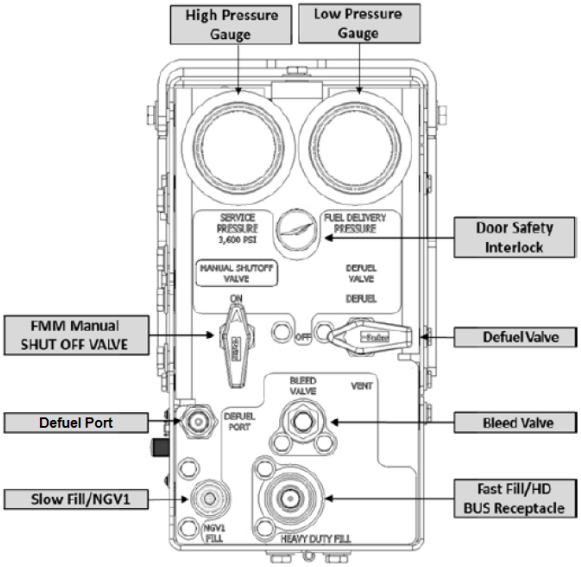


Figure 57. Manual Shut-Off Valve

C. CNG Fuel System Components

1. Fuel Cylinder(s)

 The fuel cylinder(s) stores CNG fuel at a service pressure of 3,600 psi. The fuel cylinders used on CNrG Tailgate vehicles are type-4 composite containers, manufactured to meet FMVSS 304 and NGV2b-2012 specifications. The fuel cylinders used on Top of Body and Back of Cab CNG vehicles with the Agility FMM varies, as those are supplied by the customer. In accordance with applicable regulations, the cylinders must display permanent labels which provide information necessary for inspection.

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CNG FUEL SYSTEM COMPONENTS (CONTINUED)

C. CNG Fuel System Components (Continued)

2. Cylinder Manual Shut-Off Valve

 The cylinder Manual Shut-Off Valve attached to each cylinder controls the flow of gas in and out of the cylinder. Each valve is located under a valve access cover labeled "MANUAL SHUTOFF VALVE" that is adjacent to the cylinder. Turn the valve handle FULLY clockwise to close the valve or FULLY counter-clockwise to open it.

3. Check Valve

 The 1-way check valve, located in the FMM box, is used to prevent fuel from backing up during the fuel filling process.

4. High Pressure Filter

 The high pressure coalescing filter is used to remove contaminants and oil from the fuel prior to it entering the low pressure portion of the fuel system.

5. Low Pressure Filter

 The low pressure filter is located on the frame near the engine. The low pressure filter is used to remove contaminants and oil from the fuel prior to it entering the engine. See to the engine manufacturer's recommended instructions for maintenance and replacement.

6. Pressure Regulator

 The pressure regulator reduces the pressure of fuel in the system from high pressure (3,600 psi) to low pressure (70-100 psi for the Momentum FMM) for the engine to use. Coolant from the engine circulates through the regulator to keep it from freezing. Also see **High Pressure Gauge** 132 and **Low Pressure Gauge** 132.

7. Solenoid Valve

 The solenoid valve allows pressure to flow from the regulator inlet port to the outlet port when the ignition is on.

8. Bleed Valve

 The bleed valve vents residual pressure in the FMM portion of the system to allow for maintenance procedures and purging. The bleed valve is the only fitting that it is safe to open while under pressure.

⚠ WARNING

The Bleed Valve shall not be used to defuel the system. The system must be defueled before using the bleed valve. See **Transfer Fueling (Defueling) section**.

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CNG FUEL SYSTEM COMPONENTS (CONTINUED)

C. CNG Fuel System Components (Continued)

9. Pressure Relief Devices

 The Pressure Relief Devices (PRD) are thermally-activated valves that open at a temperature of approximately 230°F. In the event of a fire, they are designed to release the fuel stored in the cylinders a safe distance from the vehicle to prevent over-pressurizing the fuel cylinders. When activated, the PRD cannot be closed and will vent all gas.

NOTES:

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FUEL SYSTEM SHUT DOWN PROCEDURE

1. Turn OFF the Fuel Management Module (FMM) Manual Shut-Off Valve.
2. Turn OFF the Fuel Cylinder Manual Shut-Off Valve on EACH tank.

CNG VEHICLE OPERATOR EMERGENCY RESPONSE

⚠ WARNING

During an emergency situation, never jeopardize safety to shut down the system. If it becomes evident that the steps cannot be safely completed, move to a safe distance, call 9-1-1 and alert emergency personnel of the situation, informing them of the presence of a CNG system and that it is not properly shut down.

Emergency Response for Gas Leaks

If the vehicle has sustained damage or a gas leak is detected:

1. Do not approach the vehicle if any sources of ignition may exist such as fire, sparks, electrostatic charges, lights or electronic devices.
2. If the vehicle is indoors, move the vehicle outside and away from any ignition sources.
3. Do not use road flares.
4. Do not smoke or allow anyone else to smoke near the vehicle.
5. Turn OFF the ignition switch, set the parking brake and turn OFF the battery at the main disconnect.
6. If it is safe to do so, turn OFF the Fuel Management Module Manual Shut-Off Valve and turn OFF the Fuel Cylinder Manual Shut-Off Valve on EACH tank. Check the fuel system near the damaged area for leaks by smell, sight, and sound. CNG is odorized and can be detected by smell.
7. Keep traffic and pedestrians away.
8. Beware that gas may continue to leak once ignition is turned off and the manual shutoff valves are closed.
9. Have a qualified technician verify leak locations with suitable methane detection fluid.
10. Have the leaks repaired by a qualified technician immediately.

Vehicle Fire Procedures

In the event of a CNG fire, it is imperative that the vehicle operator acts quickly:

1. Get passengers out of the vehicle as quickly as possible.
2. Evacuate the area.
3. Call 9-1-1.
4. If possible without putting yourself in harm's way, dump the refuse load from the body and move the vehicle a safe distance away from any burning refuse.

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CNG VEHICLE OPERATOR EMERGENCY RESPONSE (CONTINUED)

CNG Vehicle Emergency Shut Down Procedure

⚠ WARNING

During an emergency situation, never jeopardize safety to shut down the system. If it becomes evident that the steps cannot be safely completed, move to a safe distance, call 9-1-1 and alert emergency personnel of the situation, informing them of the presence of a CNG system and that it is not properly shut down.

Complete the following steps to shut down the CNG system:

1. Turn OFF Ignition and Electrical System.
2. Turn OFF Fuel Management Module Manual Shut-Off Valve.
3. Turn OFF the Fuel Cylinder Manual Shut-Off Valve on EACH tank.
4. Call Technical Services at 866-310-4345 for further assistance.

Emergency Venting/Defueling Procedure

If an emergency arises in which the fuel must be purged immediately, an emergency vent can be performed as follows:

1. Ensure that an electrical ground connection has been established between the cylinders, the vent system, and earth ground.
2. Connect the on-board defueling connection to the vent system using a conductive high pressure defueling hose.
3. Slowly open the hand valve to achieve a slow and steady flow to prevent freezing. No gas flow may indicate a normally closed solenoid valve on the cylinder. Consult the vehicle manufacturer for information on opening electronic solenoids.
4. Allow the on-board storage system to vent completely.
5. When completed, disconnect the on-board defueling connection from the vent system and disconnect the earth ground.

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STARTING VEHICLE

NOTICE

Starting a natural gas vehicle requires a delay between the battery power being turned on and the starter motor being activated.

1. Make sure that the system has been properly leak tested and that no leaks exist.
2. Make sure that plastic caps are installed on all exposed vent lines. For tailgate mounted CNG, vent lines route to the top of the tailgate. If the plastic caps are missing, contact Heil Parts Central for replacement caps (Part Number 042-2078 for 3/8" and 042-2079 for 1/2") at 800-528-5308.
3. Make sure that the cylinder shut-off valves (one on each cylinder) are “OPEN” and the manual shut-off valve is “ON”.
4. Without starting the engine, turn the key to the “RUN” position and wait 20-30 seconds. This will allow the fuel to properly fill the system and provide adequate back-pressure for the high-pressure solenoid valve to function properly.
5. Start the engine.
6. If this is the first start of the day, let the vehicle idle for five minutes. This will allow coolant to warm the fuel and ensure that the low-pressure lines down-stream of the primary pressure regulator do not freeze up. On extremely cold days, the vehicle may have to idle for a longer period until the fuel warms adequately.

FUELING PROCEDURE

A. CNG Fueling Steps

Two options exist for filling a vehicle with CNG – timed fill or fast fill. Despite the size of the receptacle, the fueling hose connects in the same manner for either type of fill.

⚠ WARNING

BEFORE fueling the CNrG Solenoid System (if equipped), **Fuel Fill Mode** MUST be engaged on the in-cab InSight™ Diagnostic Display. **While Fuel Fill Mode is engaged, the system will not detect leaks.**

The steps include:

1. For the CNrG Solenoid System only, engage **Fuel Fill Mode** on the in-cab InSight™ Diagnostic Display. For more information, see **Fuel Fill Mode** 167.
2. Locate the fueling fill receptacle in the CNG fuel module. Optional fill receptacles may be installed in a remote location on the vehicle's front bumper.
3. Remove the dust cover on the fill receptacle.
4. Remove fueling nozzle from the CNG dispenser holder.
5. Begin fueling the CNG vehicle.
6. When complete, disengage the Fueling Nozzle.
7. Return the nozzle to the CNG dispenser.
8. Replace the dust cover on the receptacle.
9. Close the CNG fuel module door and engage door lock.

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FUELING PROCEDURE (CONTINUED)

B. Types of Fueling Hoses

Dependent upon the fueling station, different types of fueling hoses may be utilized. Refer to the figures below and on the next page to determine which type of fueling hoses you will be using.

1. Type 1:

 When utilizing this type of nozzle, follow directions below to refuel:

 a. Slide the nozzle over the receptacle intake. In order to properly engage the fill hose with the receptacle, hold the nozzle in one hand. With the free hand, twist the lever counterclockwise to line up the two arrows, facing each other. Complete the connection by pushing the fueling hose fully onto the receptacle.

 b. Once the hose fits completely onto the fill receptacle, you will hear a click and the arrow on the lever will shift, misaligning with the arrow on the actual hose. This indicates that the hose fueling nozzle is properly seated onto the receptacle.

 c. When the hose fully connects, turn the lever clockwise until both arrows are pointing toward the fill receptacle to begin fueling.

 d. When fueling is complete, release the nozzle connection. Holding the nozzle in one hand, use the other hand to turn the nozzle so that arrows again point toward each other (as shown in step "a"). You will hear a release of pressure.

 e. Disconnect the fuel hose, and return it to the fuel dispenser.



Figure 58. Type 1 Fueling Hoses

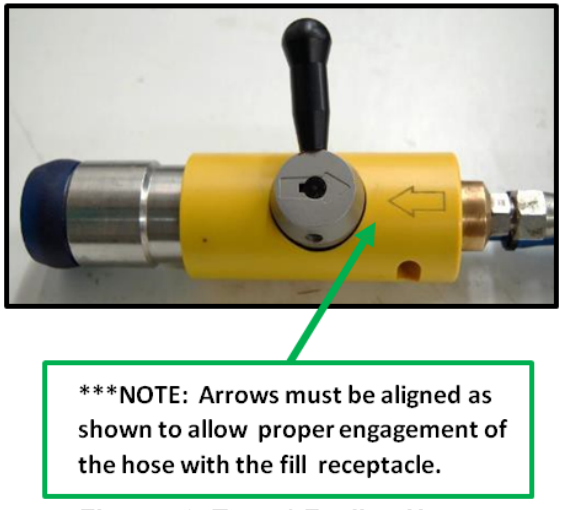


Figure 59. Type 1 Fueling Hoses

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FUELING PROCEDURE (CONTINUED)

B. Types of Fueling Hoses (Continued)

1. Type 1 (Continued):

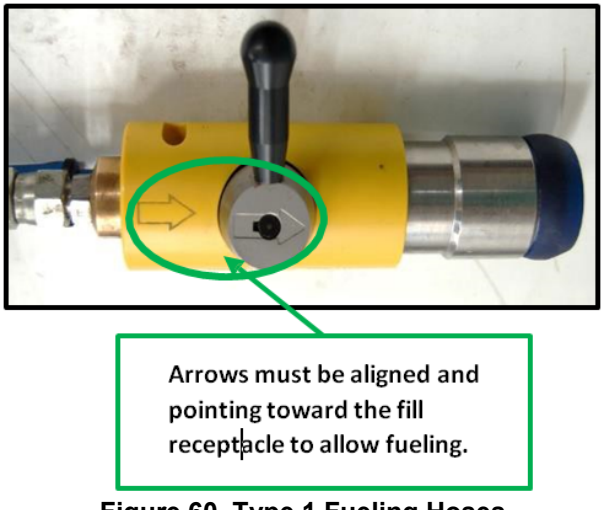


Figure 60. Type 1 Fueling Hoses

2. Type 2:

 This fueling hose operates in the following manner:

 a. Locate fill receptacle and remove dust cap.
 b. Slide fueling hose nozzle onto the fueling receptacle.
 c. Compress the hand grip until the locking lever engages.
 d. Begin fueling.
 e. When complete, release the locking lever and disconnect the fueling hose.



Figure 61. Type 2 Fueling Hose

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FUELING PROCEDURE (CONTINUED)

3. Type 3:

 To utilize this hose:

 a. Locate fill receptacle and remove dust cap.
 b. Holding firmly, press nozzle onto fill receptacle.
 c. Rotate lever clockwise 180° to begin fueling.
 d. When fueling is complete, rotate lever counterclockwise 180° to allow fuel hose disconnection.

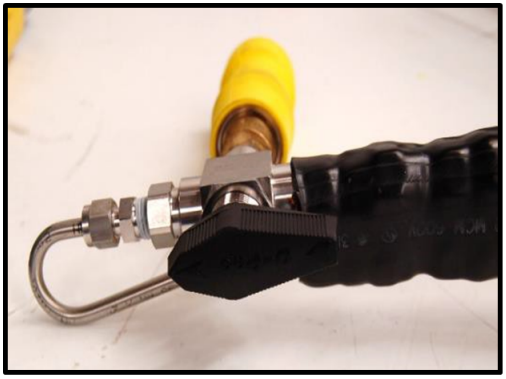


Figure 62. Type 3 Fueling Hose

TRANSFER FUELING (DEFUELING) PROCEDURES

Defueling is generally the process of removing any residual fuel from the fuel tanks and on-board fuel delivery system prior to performing any welding or a major repair.

⚠ WARNING

Never weld on a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas.

Capturing the CNG in a system that can send it back to a CNG fueling station storage facility for reuse is the most environmentally responsible method. Atmospheric venting of CNG might be illegal and against local environmental regulations for your area. Check local laws and regulations before venting CNG to the atmosphere.

Before attempting to defuel a CNG vehicle, read and understand **National Fire Protection Association (NFPA) 52 sections 6.14.1 - 6.14.4.4** as they provide a detailed list of requirements to be followed when performing defueling. Also read and understand all of the safety alert messages and procedures in the **Momentum or Agility CNG Fuel System Operation and Maintenance Manual** and the **Agility (or equipped fuel cylinder manufacturer) CNG Fuel Cylinder Inspection Manual**.

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CNG FUEL SYSTEM MAINTENANCE

Routine maintenance of the compressed natural gas system in accordance with the **CNG Fuel System Inspections Section** 149 will ensure that the system and components are functioning properly. Refer to your Heil Service Manual for CNG fuel system schematics.

⚠ WARNING

System components must not be under pressure during servicing. Servicing components under pressure may cause serious injury.

⚠ WARNING

Never weld on any part of a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas.

⚠ WARNING

Make sure the unit is in the **Lock-Out/Tag-Out mode** when you do maintenance or service procedures, or when you go in the hopper, climb in or on the body or on equipment. The unit can be operated intentionally or accidentally when the unit is not in the Lock-Out/Tag-Out mode which can cause serious injury or death to anyone in the hopper, in or on the body or on equipment.

⚠ CAUTION

Maintenance of a compressed natural gas system is to be performed ONLY by authorized service personnel. Unauthorized maintenance can result in personal injury and/or extensive damage to the unit.

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MAINTENANCE PART NUMBERS

When replacing CNG components, replace with equal or higher pressure rated components.

PART NUMBER	DESCRIPTION
151-4773-107	High-Pressure Coalescing Filter Element Kit
Refer to Engine OEM	Low-Pressure Fuel Filter Element
151-4773-126	Fast-Fill Fuel Receptacle O-Ring
To be supplied	#6 O-Ring Face Seal – O-Ring
151-4773-123	#8 O-Ring Face Seal – O-Ring
151-4773-124	#6 O-Ring Boss – O-Ring
151-4773-121	#8 O-Ring Boss – O-Ring
151-4773-125	#4 O-Ring Boss – O-Ring (Transducer O-Ring)

Note: For a complete breakdown of the FMM and CNG system, refer to the Parts Central Electronic Parts Catalog (EPC).

Register online to gain access to the EPC:
https://epc.partscentral.com

Google Chrome web browser is recommended.

NOTES:

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DEPRESSURIZING PROCEDURE

It is necessary to prepare the truck to be serviced. A mechanic's initial focus while preparing the vehicle for service should be **safety**. The primary preparation involves relieving the pressure within the system BEFORE performing any maintenance procedures, including draining or changing the high-pressure filter. Use the following procedure to remove fuel pressure from the lines connected to the high-pressure filter assembly.

⚠ WARNING

After following the Depressurization Procedure, pressure may still remain downstream of the solenoid valve, including inside the fuel cylinder(s). Use care when loosening fittings for the first time. DO NOT open any cylinder Manual Shut-Off Valves after any CNG fitting, connection, or component is loosened or disassembled

⚠ WARNING

Never weld on a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas.

1. Make sure that the ignition is turned OFF.

DEPRESSURIZING PROCEDURE (CONTINUED)

2. Close ALL cylinder Manual Shut-Off Valves (one on each cylinder) by turning the valve clockwise to the OFF position. See the image below.

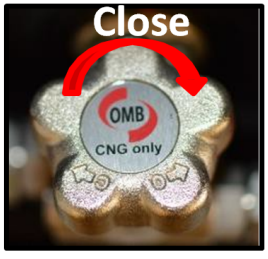


Figure 63. Cylinder Manual Shut-Off Valve

3. Verify that the FMM Manual Shut-Off Valve is in the ON position.
4. Start the vehicle and let the engine run until it stops.
5. Turn the vehicle ignition switch OFF. Follow the manufacturer's recommended vehicle lock-out procedures. Remove the ignition key.
6. Make sure the high pressure gauge on the FMM reads 0 psi.
7. Remove the FMM access panel.
8. Slowly open the bleed valve to relieve the remaining pressure.

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DEPRESSURIZING PROCEDURE (CONTINUED)

9. Turn OFF the power supply if an electrical component of the system requires service.
10. Perform any maintenance ONLY after completing these instructions.

Once this process is complete, the system will be fully depressurized up to the primary solenoid lock-off valve. Pressure may still remain downstream of the solenoid valve, including inside the fuel cylinder(s). Use care when loosening fittings for the first time. Be aware that it is normal for a small amount of gas to leak out of any fitting downstream of the solenoid lock-off valve.

RE-PRESSURIZING PROCEDURE

Once the high-pressure filter drain or change procedure is complete, perform the following procedure to re-pressurize the lines.

1. Make sure that the vehicle is OFF. Take the keys out of the ignition.
2. Close the bleed valve and torque the fitting to 4-5 FT-LBS.
3. Check that the filter bowl and the drain plug are installed and tightened.
4. Check that the FMM Manual Shut-Off Valve is in the ON position.
5. On each cylinder, slowly turn the cylinder Manual Shut-Off Valve by turning the valve counter-clockwise to the ON position.
6. Re-install the fill panel cover (if removed).
7. Insert the ignition key and start the engine.

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HIGH PRESSURE FILTER DRAIN PROCEDURE

1. Remove the excess fuel in the filter per the **Depressurizing Procedure** 144.
2. Make sure the FMM Manual Shut-Off Valve is in the OFF position.
3. Locate and access the high pressure coalescing filter inside the filter service access door. The filter location will vary, depending on the system configuration.
4. Locate the drain plug at the bottom of the filter. Hold a cloth under the port to catch any draining liquid.
5. Remove the plug and allow the liquid inside the filter to drain.
6. Re-install the drain plug and torque to 27 FT-LBS.
7. Confirm the bleed valve is closed.
8. Slowly open the FMM Manual Shut-Off Valve.
9. Check the high pressure gauge to ensure the fuel pressure has been returned in the system.

HIGH PRESSURE FILTER CHANGE PROCEDURE

1. Remove the excess fuel in the filter per the depressurization procedure.
2. Ensure the FMM Manual Shut-Off Valve is in the OFF position.
3. Locate and access the high pressure coalescing filter inside the service access door/panel. The filter location will vary, depending on the system configuration.
4. Unscrew and remove the filter bowl from the filter housing. Note the filter is equipped with wrench flats to assist removal.
5. Empty and clean the filter bowl.
6. Remove the filter element by grasping and pulling it downward out of the filter housing. Place the new filter element into position and press it into place.
7. Install a new O-ring (supplied with the filter element) into the groove on the filter housing, using lubricant supplied in the kit.
8. Re-install the filter bowl in the filter housing and torque to 40 FT-LBS.
9. Verify that the bleed valve is closed.
10. Slowly open the FMM Manual Shut-Off Valve.
11. Check the high pressure gauge to ensure fuel pressure has returned in the system.

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WELDING AND HOT WORK PROCEDURES

⚠ WARNING

Never weld on a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas.

⚠ DANGER

Never weld on any fuel system components. Welding can ignite the fuel, resulting in an explosion or fire causing serious personal injury or death.

If any welding or 'hot work' (i.e., any work that involves burning or use of tools that produce a spark, flame, or source of ignition) is required on a CNG fuel vehicle excluding the CNG fuel system, you must perform the following procedures:

1. Conduct work in a well-ventilated area.
2. Shut off every cylinder in the fuel system by turning the valve clockwise to OFF.
3. Ensure the FMM Manual Shut-Off Valve is in the ON position.
4. Start the vehicle and let it run until the engine stops.
5. Turn the ignition key OFF and remove the key.
6. Check the gauges on the FMM to ensure all pressure is at ZERO.

WELDING AND HOT WORK PROCEDURES (CONTINUED)

7. Slowly relieve excess pressure by turning the bleed valve cap counter-clockwise until a hissing sound is heard. Close the bleed valve when the hissing stops.
8. Purge the CNG fuel system with inert gas, including the tanks. See **Purging with an Inert Gas Prior to Welding or Major Repairs**.
9. Use a welding blanket to protect the fuel system from slag and sparks produced from welding and hot work operations.

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LIFTING THE VEHICLE

⚠ WARNING

Never use any part of the fuel system as a lifting point to raise the vehicle. Do not allow fuel system components to come into contact with any part of the lifting device. The fuel system can become damaged, resulting in a leak. Serious personal injury or death can occur if the gas is ignited.

Always raise the vehicle using the lifting points recommended by the vehicle manufacturer. Refer to the vehicle manufacturer's instructions for correct lifting instructions.

TOWING THE VEHICLE

⚠ WARNING

Do not attach towing equipment to or allow towing equipment to come into contact with any part of the fuel system. The fuel system can become damaged, resulting in a leak. Serious personal injury or death can occur if the gas is ignited.

Before towing the vehicle, close the Manual Shut-Off Valves on the FMM and all fuel cylinders using the **Fuel System Shut Down Procedure** 136.

Once the fuel system is shut down, follow the vehicle manufacturer's instructions for towing the vehicle.

NOTES:

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PRE-TRIP INSPECTION

Perform a Pre-Trip Inspection each day before driving the vehicle.

1. Verify the Manual Shut-Off Valve on the FMM is in the ON position.
2. Check the high-pressure gauge on the FMM to ensure it is operating and reading in a range consistent with the fuel gauge on the dash board. The fuel system maximum pressure is 3,600 psi.

 NOTE: Pressure of less than 250 psi could make the engine run rough.
3. Check the vent ports and vent caps for any signs the PRDs have been activated. Verify the vent ports and vent caps are clear of debris or damage.
4. Check the entire fuel system for any signs of damage or wear. Include checks for:

 a. Gas leaks – Smell for gas, look for frost or ice, and listen for hissing noises at joints and components.

 b. Look for external damage to housings and covers.
5. Drain the low pressure filters per the engine manufacturer's recommendation.
6. Turn the ignition key to ON and check that the low pressure gauge reading is approximately 125 psi.
7. Verify the dashboard fuel gauge is functioning properly.
5. Have the fuel system and cylinders inspected by a certified CSA Cylinder and Fuel System Inspector if damage is found on any part of the components or structural parts of the fuel system.

WEEKLY SYSTEM INSPECTION

Perform the Weekly System Inspection to ensure the system is operating correctly, safely, and to maximize component performance.

1. Verify all of the cylinder Manual Shut-Off Valves move freely and are in the ON position.
2. Visually inspect the fuel system for any signs of damage or wear.
3. Check for damage on the cylinder shields and covers.
4. Check to ensure the cylinders are mounted securely. Inspect the mounts, brackets, rubber isolators, and all fasteners.
5. Check for leaks on all CNG fuel plumbing tubes, hoses, and fuel flow components. Check for the odor of rotten eggs. Look for frosting or the sound of hissing at valves and fittings.
6. If any system components or structural parts are damaged, the system and cylinders must be inspected by a CSA-certified fuel system inspector.

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CNG FUEL SYSTEM INSPECTION/PREVENTIVE CARE SCHEDULE

ITEM	FREQUENCY
Check Vent Lines	Daily
Drain Low Pressure Filter	Daily
Perform **Daily CNG Fuel System Inspection** 151 on next page.	Daily
Replace Low Pressure Filter	Refer to the engine manufacturer for maintenance and replacement guidelines.
Drain High Pressure Filter	Weekly
Replace High Pressure Filter Element	At regular oil change intervals or every 30,000 miles
Drain Vent Lines	Every month (or immediately if blue vent cap is missing)
Leak Test with Methane Detector*	Monthly, or if involved in any accident, or if you smell gas.
Component Inspection*	Monthly
Cylinders*	Inspect compressed gas cylinders as outlined by cylinder manufacturer
* To be completed by a qualified and trained person.	

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CNG FUEL CYLINDER AND SYSTEM INSPECTION

⚠ WARNING

If a CNG-fueled vehicle has been involved in an accident or fire, the system and cylinders must be inspected by a certified CNG fuel system inspector.

NOTICE

Inspections must be performed by qualified inspectors using guidelines from the fuel cylinder manufacturer in addition to the guidelines listed here.

1. Based on cylinder manufacturer recommendations and industry standard practices, visual CNG cylinder inspections should be performed at a frequency of 3 years or 36,000 miles, whichever occurs first.
2. In addition, Heil recommends a daily walk-around or pre-trip and post-trip visual inspection be performed.

3. NOTES:

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CNG FUEL SYSTEM TROUBLESHOOTING

Heil offers support via the technical assistance line, as well as products, such as a Fuel Module Mini-Tester (Part Number 044-0488), to assist with troubleshooting.

Please provide the following when calling Heil Technical Services at 866-310-4345 with troubleshooting questions:

1. Serial # of CNG Fuel Module
2. Truck Serial #
3. Details of:
 - When the problem started
 - What the problem entails
 - Any troubleshooting performed
 - Results of troubleshooting actions

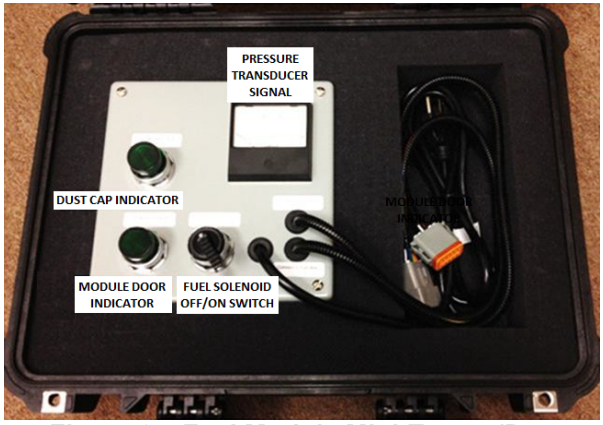


Figure 64. Fuel Module Mini-Tester (Part Number 044-0488)

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CNG FUEL SYSTEM TROUBLESHOOTING (CONTINUED)

The following table lists possible problems, along with causes, corrections, and results.

PROBLEM OBSERVED	POSSIBLE CAUSES	CORRECTIVE/ DIAGNOSTIC ACTIONS	RESULTS AND OTHER ACTIONS
Vehicle's starter will not operate.	Interrupt door switch signal is not being properly recognized by the vehicle.	Disconnect the 12-pin electrical connector at the rear of the fuel module. Use an ohm meter or continuity tester across pins (GRN) and 10 (YEL) of the fuel module side of the connector (female connector). Press and release the fuel module interrupt door switch. When the switch is depressed, there should be continuity between pins 9 (GRN) and 10 (YEL). Continuity should be lost when the switch is released.	If operation of the door switch makes and breaks continuity as described, and the starter will not operate, there is most likely a problem in the vehicle's wiring. If the operation of the door switch does NOT make or break continuity as described, there is most likely a wiring problem in the fuel module. If the problem cannot be resolved, call **866-310-4345** for technical assistance.

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CNG FUEL SYSTEM TROUBLESHOOTING (CONTINUED)

The following table lists possible problems, along with causes, corrections, and results.

PROBLEM OBSERVED	POSSIBLE CAUSES	CORRECTIVE/DIAGNOSTIC ACTIONS	RESULTS AND OTHER ACTIONS
Vehicle's starter operates but the vehicle does not run.	Fuel is not making it through the fuel module to the engine.	*The manual valve on the front of the fuel module should be set to "On". *The fuel module high pressure gauge should read above 5000 psi. Disconnect the 12-pin electrical connector at the rear of the fuel module. Use a DC voltmeter across pins 8 (BLU) and 9 (GRN) of the vehicle side of the connector (male connector). The voltage should read: • Ignition switch "Off" 0 vdc. • Ignition switch "Run" 12 vdc. • Ignition switch "Start" 12 vdc. *Reconnect the 12-pin electrical connector at the rear of the fuel module. Have an assistant repeatedly cycle the ignition switch between "Off" and "Run" while listening for the "click" of the fuel solenoid being actuated near the maintenance door.	*If the voltage does NOT change as described, the problem is most likely located in the vehicle's electrical signal that actuates the fuel solenoid. *If the voltage changes as described and the "click" of the fuel solenoid is detected, the problem is most likely an engine control problem prohibiting the vehicle from starting. *If the voltage changes as described but the "click" of the fuel solenoid is NOT detected then the problem is most likely a failed solenoid in the fuel module. *If the problem cannot be resolved, call **866-310-4345** for technical assistance.

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CNG FUEL SYSTEM TROUBLESHOOTING (CONTINUED)

The following table lists possible problems, along with causes, corrections, and results.

PROBLEM OBSERVED	POSSIBLE CAUSES	CORRECTIVE/DIAGNOSTIC ACTIONS	RESULTS AND OTHER ACTIONS
Heil Standard CNG and CNrG™ Tailgate Solenoid System Options: In-cab fuel gauge does not indicate the fuel level correctly.	The fuel module pressure transducer, the fuel gauge or the interconnecting wiring may be defective.	Confirm that the 12-pin electrical connector at the rear of the fuel module is connected and place the vehicle's ignition switch in the "Run" position. Use a voltmeter to read: • Voltage between connector positions 2 (RED) and 3 (BLK). the voltage should be 12 vdc. • Voltage between connector positions 3 (BLK) and 4 (WHT). the voltage should be between 0.5 to 5.0 vdc.	*If the voltage across 2 and 3 is 0 or significantly below battery voltage, there is a problem with the vehicle's wiring not supplying power to the fuel module's pressure transducer. *If the voltage across 3 and 4 is either 0 or 5.5 vdc, the fuel module's pressure transducer is most likely defective. Call **866-310-4345** for technical assistance. *If the voltage across 3 and 4 is between 0.5 to 5.0 vdc then the fuel module's pressure transducer is operating correctly. The problem is likely in the vehicle's wiring or the in-cab fuel gauge. *If the problem cannot be resolved, call **866-310-4345** for technical assistance.

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CNG FUEL SYSTEM TROUBLESHOOTING (CONTINUED)

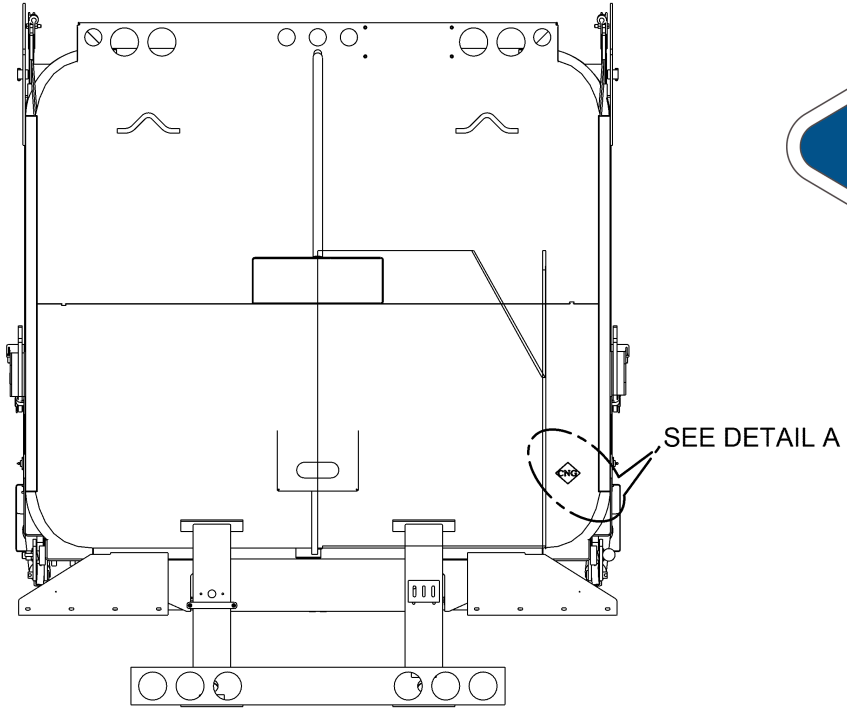
The following table lists possible problems, along with causes, corrections, and results.

PROBLEM OBSERVED	POSSIBLE CAUSES	CORRECTIVE/DIAGNOSTIC ACTIONS	RESULTS AND OTHER ACTIONS
Heil CNrG™ Tailgate Solenoid System Option: In-cab Cortex Display does not indicate the fuel level correctly or an alarm is activated on the Cortex Display indicating "Transducer-# Unplugged/ Short Check Sensor and Wiring" Fail for a given Tank#.	The fuel cylinder pressure transducer or the interconnecting wiring may be defective.	Confirm that the 3pin electrical connector at the transducer is connected and place the vehicle's ignition switch in the "Run" position. Use a voltmeter to read: • Voltage between connector positions A (BRN) and B (BLK). The voltage should be approximately 12 vdc. • Voltage between connector positions B (BLK) and C (YEL). The voltage should be between 0.5 to 5.0 vdc.	*If the voltage across A and B is 0 or significantly below battery voltage, there is a problem with the vehicle's wiring not supplying power to the fuel module's pressure transducer. *If the voltage across B and C is either 0 or 5.5 vdc, the fuel tank's pressure transducer is most likely defective. Call **866-310-4345** for technical assistance. *If the voltage across B and C is between 0.5 to 5.0 vdc then the fuel module's pressure transducer is operating correctly. The problem is likely in the Cortex Display or the Cortex Controller. *If the problem cannot be resolved, call **866-310-4345** for technical assistance.

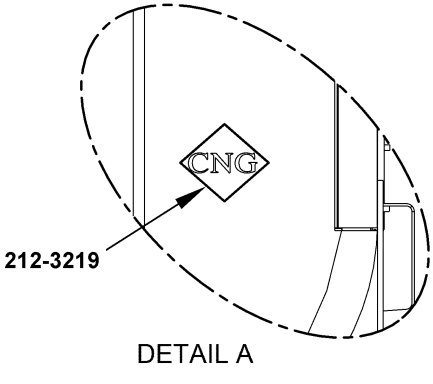
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CNG FRONT OF BODY / TOP OF BODY DECAL PLACEMENT

In addition to the decal shown below, there may be other decals placed on the Fuel Management Module (FMM), tank compartments or elsewhere on the CNG system components. Refer to the CNG Fuel System Manufacturer's Operation and Maintenance Manuals for replacement decal part numbers.







DETAIL A

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HEIL CNrG™ SOLENOID SYSTEM OPTION

When equipped, the optional Heil CNrG Solenoid System will monitor and display live in-cab CNG system and tank pressures and notifications on the InSight™ Diagnostic Display. Additionally, the system detects and alerts of leaks (visually and audibly) while closing solenoid valves of affected tanks to isolate the leak(s).

On the display, tanks are numbered starting with the tank at the top of the of the CNrG tailgate, "TANK-1", and ending with the tank lowest in the CNrG tailgate, in the system shown below, "TANK-7". When the system is operating without any issues, all boxes are green as shown below.

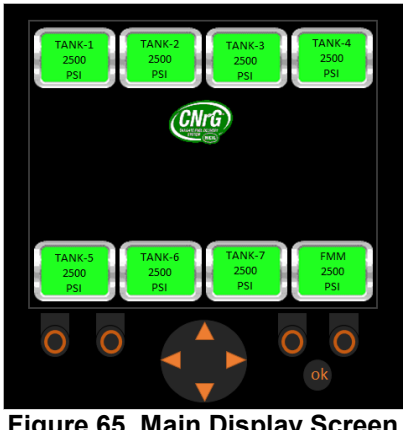


Figure 65. Main Display Screen

Summary of Features

- Display screen inside the cab which gives live pressure monitoring for each tank and system.
- Visual warning in form of messages and color on the screen along with audible alarm whenever solenoid failure occurs.
- System visual and audible warning if one of the pressure transducers is unplugged in either ignition ON or OFF conditions.
- Whenever the ignition is OFF and truck is not running, system gives audible alarm in the event of any leaks on tank or system side. The operator needs to turn the ignition ON and check the display screen that will show the tank location of the leak.
- As a safety feature, all solenoids will be closed whenever there is a leak. A maintenance bypass code will need to be entered to be able to open solenoids and drive the vehicle. The leak detection feature is available only when the ignition is OFF.
- Leaks are detected at a pressure difference of 600 psi.

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HEIL CNrG™ SOLENOID SYSTEM OPTION (CONTINUED)

Pressure Transducer Sensors

⚠ WARNING

ALL Pressure Transducer Sensors MUST be functioning for System to be able to detect a leak.

⚠ WARNING

Tank MUST be empty before removing tank Pressure Transducer Sensor.

Plugged directly into the live port of the valve of each tank and behind the FMM (Fuel Management Module) box live line, the pressure transducer sensors measure live pressures of each tank and of the system. When a pressure transducer sensor fails or becomes unplugged, the system sends a visual warning on the InSight™ Diagnostic Display along with an audible alarm.

Whenever there is a single sensor issue, the main screen will show which sensor has failed as shown in the figure to the top right. However, if there are multiple sensor issues, it will tell you to go to alarm summary screen to get more details as shown in the figure to the bottom right.

NOTICE

The audible buzzer will be active regardless of ignition ON or ignition OFF and will not turn OFF until the issue is corrected.

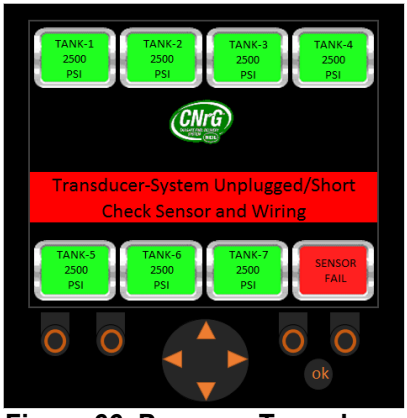


Figure 66. Pressure Transducer Sensor behind FMM Unplugged/Faulty



Figure 67. Multiple Pressure Transducer Sensors Unplugged/Faulty

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HEIL CNrG™ SOLENOID SYSTEM OPTION (CONTINUED)

The Alarm Summary Screen can be reached by pressing the right arrow on the display twice.

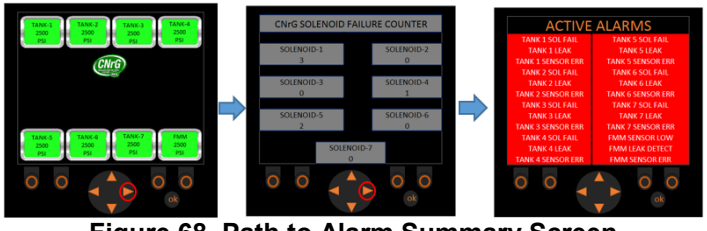


Figure 68. Path to Alarm Summary Screen



Figure 69. Alarm Summary Screen

Solenoid System Function

The valve body on each CNG tank has an integrated solenoid. The solenoids are normally closed when the ignition is OFF and open when ignition is ON and a voltage is supplied to them.

Leak Detection/Solenoid Lock

The system is capable of detecting a leak in the system or leak in any tank when the ignition is initially OFF and the leak starts. For safety purposes, if a leak is detected, all solenoids are locked in the closed position and not allowed to open until a maintenance code is entered and bypass is activated. The audible alarm activates whenever there is pressure difference detected of 600 psi or more and the truck ignition is OFF (ignition must be turned ON to see more details about the leak on the display screen).

NOTICE

Authorized Service Personnel should contact Heil Technical Service for the maintenance code to unlock the CNG solenoids.

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HEIL CNrG™ SOLENOID SYSTEM OPTION (CONTINUED)

Leak Detection/Solenoid Lock (Continued)

The figures on this page show example display screenshots of possible leak detection notifications. Other leak detection notifications exist and are not shown here.

⚠ WARNING

You must follow all safety/emergency procedures of your company in the event of a CNG leak. At a minimum, follow the instructions on Emergency Shutdown Procedure section of this manual.

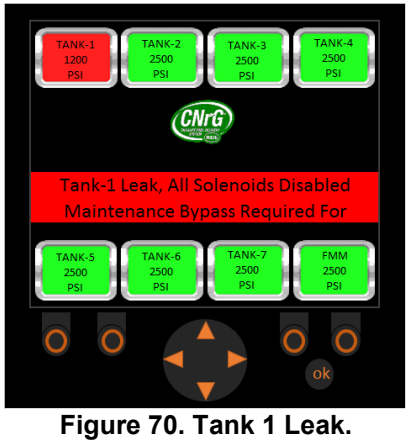


Figure 70. Tank 1 Leak. Maintenance Bypass Required.

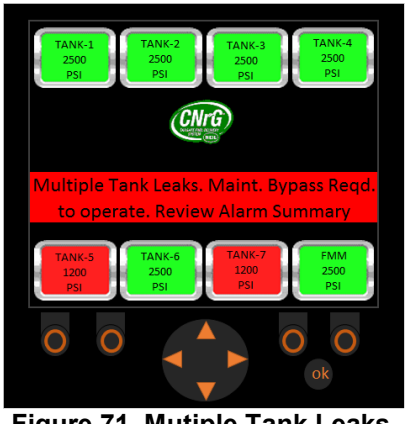


Figure 71. Mutiple Tank Leaks. Maintenance Bypass Required.

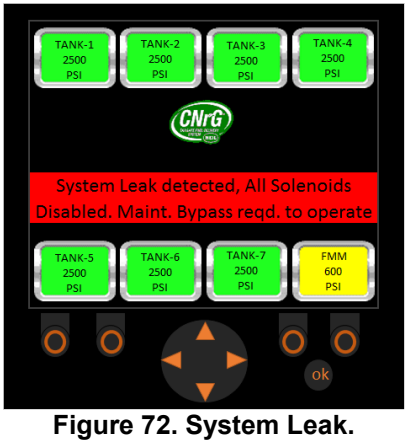


Figure 72. System Leak. Maintenance Bypass Required.

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HEIL CNrG™ SOLENOID SYSTEM OPTION (CONTINUED)

Solenoid Failure Detection

The system is capable of detecting solenoid failures to open (in the event of a wiring or component issue) when the ignition is turned ON as per requirement of NFPA 52.

Whenever there is a single solenoid issue, the main screen will show which solenoid has failed as seen on the figure to the top right of this page. However, if there are multiple solenoid issues, it will tell you to go to alarm summary screen to get more details as seen in the figure to the bottom right. **Alarm Summary Screen** 160 can be reached by pressing the right arrow on the display twice.

The figures on this page show example display screenshots of solenoid failure detection notifications. Other solenoid failure detection notifications exist and are not shown here.

To defuel after a solenoid failure on one of the tanks, first refer to **Heil CNrG™ Solenoid System Defueling After Solenoid Failure** 167 and then use one of the methods described in **CNG Fuel Module Defueling Methods**.

NOTICE

The audible buzzer will be active only when ignition is ON and will not turn OFF until the issue is corrected.

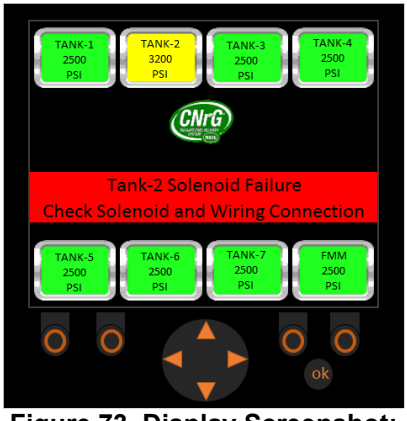


Figure 73. Display Screenshot: Tank 2 Solenoid Failure

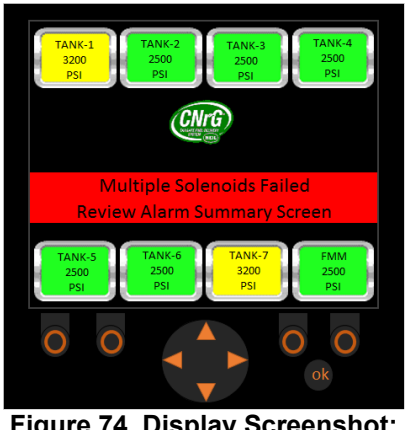


Figure 74. Display Screenshot: Multiple Solenoids Failed

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HEIL CNrG™ SOLENOID SYSTEM OPTION (CONTINUED)

Maintenance Bypass

The following are the steps must be followed by a qualified maintenance technician after getting any display messages described in this manual. This will allow a qualified service person to get the truck back on route/correct the issue:

⚠ WARNING

Enabling Bypass Mode will disable System Leak Interlocks. Bypass will not open the solenoid of a leaking tank.

1. Driver will need to call maintenance department of their company in order to drive/move the truck since all solenoids are locked and need maintenance bypass for them to open.
2. For any leaking tank, open the oblong access covers on the street side of the CNrG tailgate and then close that tank's manual shut off valve. (You must correct the leaking tank before the system will allow the solenoid for that tank to open.) In case of system leak, solenoids will not open until Bypass Mode is "ON" (system leak is a leak detected in the line going from FMM to tanks on high pressure side).
3. Go inside the cab and on display screen hold "ok" button on screen until it prompts you to enter maintenance code.
4. Enter the maintenance bypass code and you will see the screen shown in the figure to the right.

NOTICE

Authorized Service Personnel should contact Heil Technical Service for the maintenance bypass code to unlock the CNG solenoids.

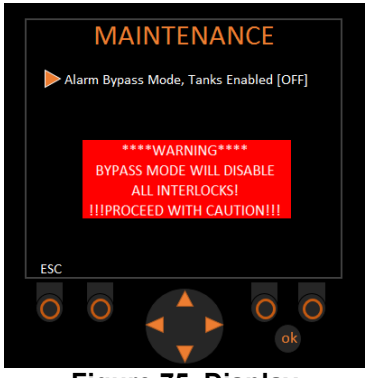


Figure 75. Display Screenshot: Maintenance Screen

5. Make sure you have first closed the manual shut off valves on the tanks that are leaking (Step 2). You will notice that the Bypass Mode is OFF by default. Press "ok" button and turn ON Bypass Mode. Once you do this, all solenoids (except leaking tank/tanks) open. However, all tanks are now connected to each other and to the main supply/return line. This is the reason it is very important to first perform Step 2 before performing this step.
6. You will now be able to drive the truck to your maintenance department to evaluate and repair the leak. The audible alarm will not go OFF until the issue is corrected.

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HEIL CNrG™ SOLENOID SYSTEM OPTION (CONTINUED)

Low Fuel Level Detection

The system is capable of detecting low fuel levels and will give audible and visual alerts that the truck needs to be refueled, as shown in the figure below. Whenever pressure drops below 500 psi on the system side, the system will show a Low Fuel Warning alert message along with an audible alert.

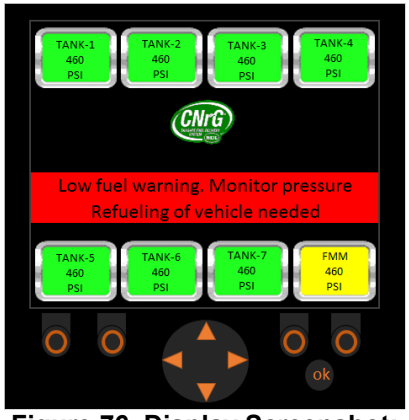


Figure 76. Display Screenshot: Low Fuel Warning

CNG Tank Option Configuration

The system is designed for different tank configurations and is a common design which will work from 3 tank to 7 tank system. This helps the customer to upgrade to higher DGE (Diesel Gallon Equivalents) by adding more tanks without need to modify anything in this system. The figure below shows a snapshot of the Tank Option Configuration maintenance screen where you can configure the number of tanks on the truck.

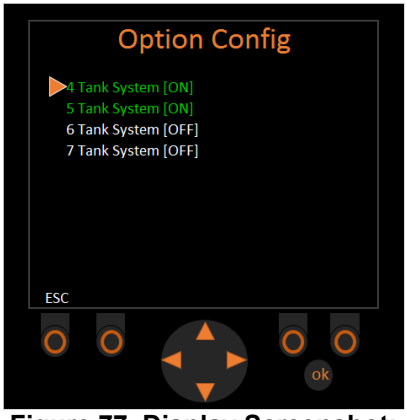


Figure 77. Display Screenshot: Tank Option Configuration

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HEIL CNrG™ SOLENOID SYSTEM OPTION (CONTINUED)

System Inputs

The display screenshot shown below (within the maintenance mode menu) is used for troubleshooting and maintenance to gather information for the current status of the Ignition Power (ON or OFF) and the system voltage being supplied to the Cortex Controller™. It also provides the software revisions of the Cortex Display and Cortex Controller programs.

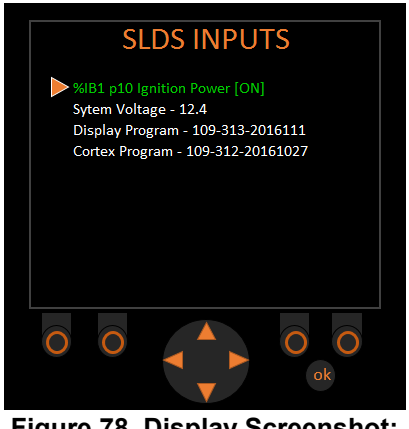


Figure 78. Display Screenshot: System Inputs

System Outputs

The display screenshot shown below (within the maintenance mode menu) is used for troubleshooting and maintenance to gather information for the current status of the Solenoids on each Tank (ON or OFF). It also provides the status of the System Alarm for the Cortex Controller.

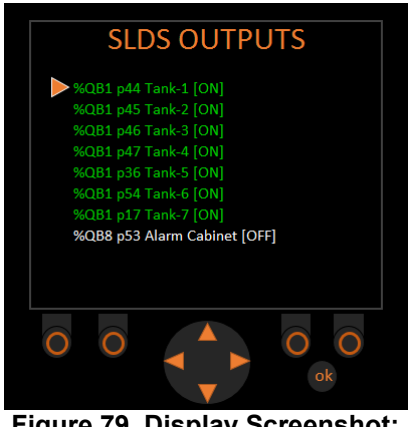


Figure 79. Display Screenshot: System Outputs

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HEIL CNrG™ SOLENOID SYSTEM OPTION (CONTINUED)

Ignition Power OFF

The display notification shown in the figure below will only be displayed in the event that the InSight™ Diagnostic Display has Ignition Power and the Cortex Controller™ does not have Ignition Power. This Alarm can be beneficial in the event that all Tank Solenoids Valves have failed to open due to the loss of Ignition Power, which is required to open the Tank Solenoids Valves.

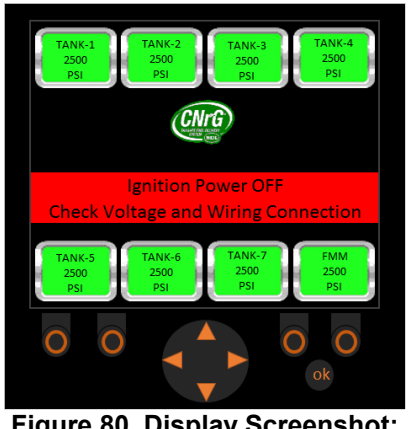


Figure 80. Display Screenshot: Ignition Power OFF

System Over Voltage

The display notification shown in the figure below will only be displayed in the event that the System Voltage is greater than 36 volts for 10 seconds, indicating that there is voltage too high to safely operate the Cortex Controller and Display.

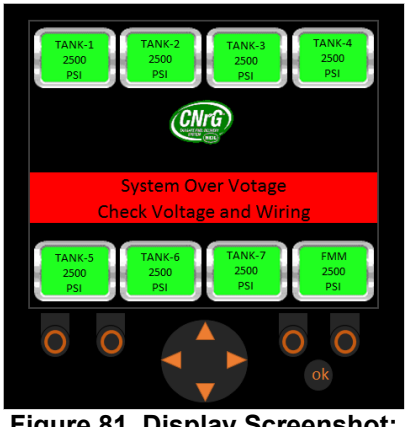


Figure 81. Display Screenshot: System Over Voltage

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HEIL CNrG™ SOLENOID SYSTEM OPTION (CONTINUED)

System Under Voltage

The display notification shown in the figure below will only be displayed in the event that the System Voltage is less than 8 volts, indicating that there is voltage too low to safely operate the Cortex Controller and Display.

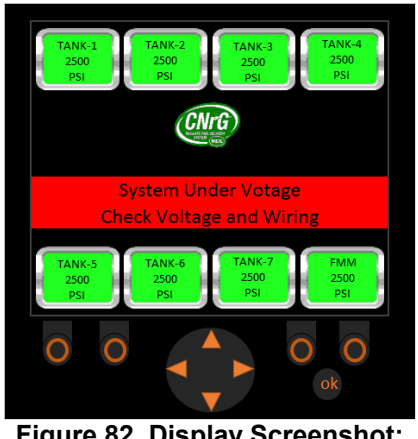


Figure 82. Display Screenshot: System Under Voltage

Fuel Fill Mode

For the CNrG Solenoid System only, engage Fuel Fill Mode on the in-cab InSight™ Diagnostic Display to open the CNG solenoids, allowing for fast fill fueling. The "FUEL FILL MODE" button turns green when engaged. After Fuel Fill Mode is engaged, the Fuel Fill Mode remains active for one (1) hour or until the ignition key switch cycles ON-OFF-ON.

⚠ WARNING

BEFORE fueling the CNrG Solenoid System (if equipped), **Fuel Fill Mode** MUST be engaged on the in-cab InSight™ Diagnostic Display. **While Fuel Fill Mode is engaged, the system will not detect leaks.**

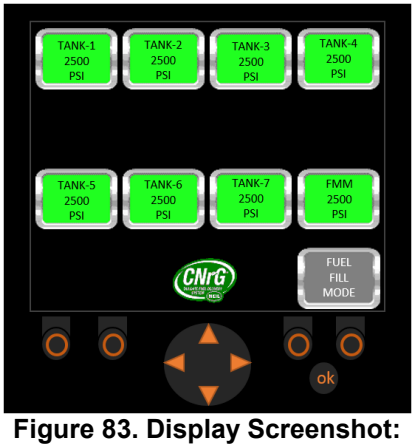


Figure 83. Display Screenshot: Fuel Fill Mode OFF

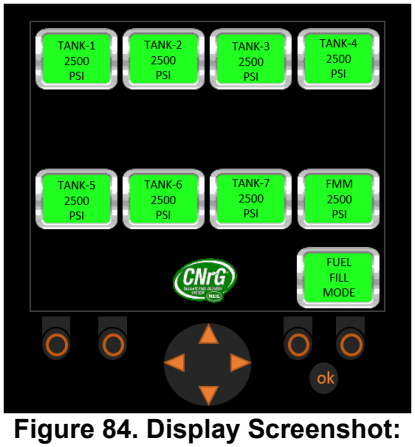


Figure 84. Display Screenshot: Fuel Fill Mode ON

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NOTES:

HEIL ENVIRONMENTAL WARRANTY STATEMENT

The Heil Co. d/b/a Heil Environmental ("Heil") warrants its solid waste collection equipment to be free from defects in material and workmanship under normal use for a period of one (1) year or 2000 hours of operation (whichever comes first) from the date of equipment In-Service or during the period of coverage offered by an extended warranty program, when proper service and maintenance as described in Heil Service Bulletins and Parts & Service Manuals are performed. The standard or extended equipment warranty is not transferable except for sales demonstration units.

This warranty is expressly limited to the repair or replacement of any component or part thereof, of any such refuse or recycling collection body manufactured by Heil that is proven to Heil's satisfaction to have been defective in material or workmanship. Such components or parts shall be repaired or replaced at Heil's option without cost to the standard purchaser for parts and labor provided such unit is returned to an authorized Heil Distributor for replacement or repair. The repair or replacement must be made during the standard or extended warranty coverage period. Before any warranty can be allowed on new equipment, a validated warranty registration form must be on file with Heil's Customer Service Department within sixty (60) days of the equipment's In-Service date. Wear items are excluded from warranty coverage.

All OEM service parts sold by Heil have a six (6) month warranty from the date of purchase. Aftermarket parts purchased from Heil are supported by a 90-day warranty. The parts warranty covers parts only, providing that factory inspection reveals a defect in material or workmanship. Labor, troubleshooting, equipment downtime, etc. is not covered under the parts warranty policy.

HEIL MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AND MAKES NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE. HEIL DOES NOT ASSUME ANY LIABILITY OR ACCEPT CLAIMS FOR LOSS OF PROFITS, PRODUCT DOWN TIME OR ANY OTHER DIRECT, INCIDENTAL OR INDIRECT CONSEQUENTIAL LOSSES, COSTS, DAMAGES OR DELAYS.

Any improper use, operation beyond rated equipment or component capacity, substitution of parts that are not Heil-approved, or any alteration or repair by others in such a manner as in Heil's sole judgment affect the product operation or integrity shall void the warranty.

Other than the extension of the standard warranty period purchased under a supplemental Heil Extended Warranty Program, no employee or representative is authorized to modify this warranty in any way nor shall any other warranties be granted. No dealer-supplied warranty program is endorsed or supported by Heil.

Heil retains the right to modify its factory warranty program prospectively at any time.

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